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Mounting Orders Stimulate Automotive Optimism

Production problems being overcome as factories struggle to catch up with demands of their dealers for new cars

by Don Blanchard
Editor, Automotive Industries

WITH dealer orders rolling in far faster than finished cars are rolling out, there is a buoyant atmosphere in Detroit and other automotive centers that makes the industry's conservative optimism as the new year began seem almost like pessimism in comparison. Where, at the New York Show, estimates of 1934 output centered around the 2,500,000 mark, now forecasts of 3,000,000 to 3,500,000 units are not uncommon.

While it is recognized that the influx of orders during the last month does not necessarily represent actual retail orders booked, particularly in view of the low level of dealer stocks at the end of 1933, the industry nevertheless regards the active demand from its retailers as evidence that spring will bring a resumption of the uptrend in retail sales which began last year. Attendance at shows in various parts of the country reveals an almost unprecedented interest in the new models, and the rate at which factories are receiving orders indicates that dealers consider this interest to be an omen of expanding public buying.

Of course, there is the chance that dealers have misguaged the nature of the public's interest. On the other hand, the declining sales trend in recent years has impressed most of them with the importance of proper inventory control. Consequently, it seems doubtful that they would be ordering cars at the present rate if they didn't feel reasonably sure that the public is interested in buying, and not merely curious about the radical features of the new cars. Moreover, the rate at which dealers in a position to make deliveries, are reporting sales, provides a concrete indication that the long awaited buying revival is beginning to evidence itself.

Although the effects of last fall's tool and die strike have not been entirely overcome, production generally is being expanded steadily. In the week ended Jan. 27, output approximated 45,000, with 10 plants stepping up their output over the preceding week, when about 35,000 units were built. Steep as this rise in output is, it has not been fast enough to keep pace with mounting orders. The pressure for cars has reflected back on the industry's suppliers and they too are working under forced draft to make shipments.

The radical departures found on many 1934 models have made the manufacturing problem even more complicated than it might otherwise have been, as some of the new constructions have required the development of new production techniques. Getting these new methods functioning with the smoothness required for quantity production, has slowed things up in some factories.

Passenger Car Production by Wholesale Price Classes

(U. S. and Canada)

12 Months 1933 and 1932 Compared.

	1933	1932	Per Cent Change	Per Cent of Total 1933	Per Cent of Total 1932
Under $500	1,349,638	794,188	+70.0	81.3	67.0
$500-$750	237,099	260,831	— 9.0	14.3	22.0
$750-$1,000	32,610	74,610	—56.3	2.0	6.3
$1,000-$1,500	20,125	36,670	—45.2	1.2	3.1
$1,500-$2,000	10,409	8,699	+19.5	0.6	0.7
$2,000-$3,000	8,725	8,679	+ 0.6	0.5	0.7
$3,000 and over	1,952	2,532	—23.0	0.1	0.2
Totals	1,660,558	1,186,209	+39.9	100.0	100.0

As a consequence of rising production, employment also is increasing rapidly. Automotive plants in Michigan are reported to have 325,000 on the payrolls, 100,000 more than at this time last year. In Detroit, the motor industry is employing 245,000, against 170,000 a year ago. Total employment by the General Motors Corp. was placed at 158,000 last week, an increase of 33,000 over 1933, while Chrysler, at the same time, had 43,000 on the payrolls, which is approximately double last year's figures. Ford, with a reported 90,000 employed, is said to have more men at work in his various plants than at any time in four years. Hudson employment totals 8000, a 100 per cent gain over last year. Nash has 3250 working at Kenosha and 500 at Racine.

Regarding volume of business, a Chrysler statement puts January orders for new cars at $50,000,000, representing 88,000 units, an increase of 400 per cent over last January. Dodge received orders for 32,300 units between Jan. 1 and 20. Plymouth orders total $21,000,000. Nash built 3800 cars in December and is expected to exceed this figure in January and February, with the result that its production in this three-month period will exceed its entire output of 11,500 in the fiscal year ending Nov. 30, 1933. Ford production is reported at 3000 daily, and his January output is estimated at 56,000. Chevrolet, with orders for 100,000, passed the 2000 daily mark on Jan. 24 with an output of 2141, and expects to have all of its plants at capacity within a few weeks. Buick again is making trainload shipments to some of its important distributing points.

With the production picture so encouraging, much less concern is being felt over a possible adverse public reaction to generally higher list prices and lower used car allowances. Orders from dealers indicate that they feel that the public regards the new price set-up as fair. Meanwhile, efforts of some factories, notably General Motors divisions, to reduce the spread between list and delivered prices are being watched with keen interest by the industry. Such reductions offset in part the increase in f.o.b. prices, as recent statements by General Motors executives have emphasized. Although these statements have been widely interpreted to mean that Chevrolet would advertise delivered prices in much the same manner as it has advertised list prices, the company has no present intention of adopting this policy. Dealers will quote and advertise delivered prices, but it is understood that where prices are used in factory advertising, list prices will be featured.

Truck Production by Capacities

(U. S. and Canada)

	1933	1932	Per Cent Change	Per Cent of Total 1933	Per Cent of Total 1932
1½ and under	336,699	226,911	+48.3	92.3	92.6
2 to 3 tons	22,952	13,106	+74.8	6.3	5.3
3½ and over	3,610	4,232	—14.7	1.0	1.7
Ambulances, fire, buses, etc.	1,306	1,036	+26.0	0.4	0.4
Total	364,567	245,285	+48.6	100.0	100.0

JUST AMONG OURSELVES

Records of Long Service

FIGURES released by Packard help to emphasize the attention which most automobile manufacturers have given to trying to maintain stability of working forces even during the depression. Of all the employees now in the Packard plant, the release states, 72.4 per cent have been with the company five years or more; those who have been with Packard 10 years or more comprise 28.4 per cent of the total.

Even taking into account the fact that the total working force doubtless is considerably less than it was in peak times—thus tending to increase the percentage of long-service employees, even without increase in the actual number—the record seems to us one definitely to be proud of. In 1933, 277 people completed ten years of unbroken service with the company.

* * *

Colors Come Back As Depression Goes

VISUAL as well as statistical evidence is arriving of depression's departure. Black, as followers of Duco's famous color index know, has been the favorite color on production cars every year since 1930. Blue people, it seems, preferred black cars. But it's going to be different this year, apparently.

"Black . . . is not so potently regarded for 1934 by car builders" Howard Ketcham, Duco's color expert said the other day. He had just analyzed in detail the color combinations on the cars in the New York show. Fewer cars appeared in black than ever before, he said, pointing out that many prominent exhibitors omitted black entirely from their showings. The order in which car builders anticipate consumer color preference to express itself this year, judging from the number of entries in each of these hues displayed at the Palace, Mr. Ketcham's analysis shows, is as follows: Maroon, Blue, Green, Brown, Grey, Black.

* * *

The New Deal for Indianapolis Racers

INDIANAPOLIS Race will have one important new feature of interest this year——limitation of gasoline consumption to 45 gallons. Two-cycle engined cars —if any—will be permitted 55 gallons. Starters this year will be limited to 33; last year there were 42.

Unfortunately there are no current indications that additional factories will race semi-stock cars under their own names. Plenty of semi-stock jobs will be in the 500-mile grind again, it is certain, but so far nobody seems ready to emulate Studebaker by entering a factory-sponsored team.

Annual A.A.A. Contest Board meeting during New York Show week this year was particularly interesting because reports presented showed the Board to have increased its prestige, effectiveness and income during so trying a year as 1933. Besides, Gar Wood was a guest at luncheon in between sessions and we had the pleasure of meeting him for the first time. He was planning to go South soon after, but didn't expect to do any speed boat running down there this year. He's getting ready for next year's Harmsworth Trophy race though!

* * *

Security Act Change Appears Assured

"Modification of the Federal Securities Act now appears assured," says Lawrence Sullivan, *Forbes* Washington observer. Roosevelt officially stands his ground on the original measures, it seems, "but there is now a somewhat general feeling on Capitol Hill that the White House would not block a modifying measure initiated by the Senate Banking Committee."

Additional backing for the idea that modification is likely comes from contact with various Wall Street sources during the past week. While the wish has been father to thought down in the Financial Cavern for some time, rumors of possible change unquestionably have become more insistent in the last week or two.

Automotive financing and refinancing will pick up quickly, we believe, if this prediction comes true. Upward movement of the business cycle now is established sufficiently well to assure constructive development in more than one automotive situation which has stayed in *status quo* thus far chiefly because of Securities Act hazards. Consummation of Mr. Sullivan's prohecy will be encouraged by fervent prayers behind the scenes of more than one automotive picture.—N. G. S.

Wright Develops Technique fo Casting of Magnesium Alloy E

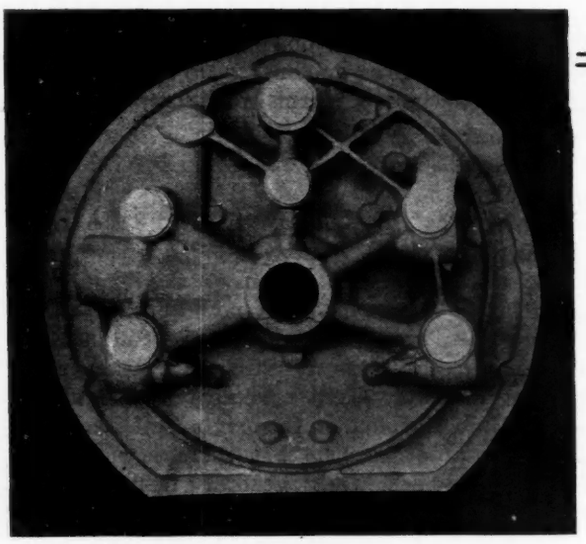


Fig. 1 — Crankcase rear cover is an example of the type of castings produced of magnesium alloy at the Wright foundry.

RECENTLY in visiting a foundry which proudly boasts that it is the only large scale foundry in the world devoted exclusively to the production of aircraft engine castings, we witnessed the fascinating development of castings of high-strength, low-weight magnesium alloy. And, through the courtesy of the Wright Aeronautical Corp. of Paterson, we are permitted to give some of the high spots of this work.

The foundry is devoted exclusively to the castings of non-ferrous alloys, the bulk of which are aluminum alloys of various specifications. By a careful research program this foundry has perfected a technique of handling the magnesium alloys and expects, in time, to extend their use to a wide variety of aircraft engine parts.

By adhering to materials of standard specifications the foundry is able to handle a large volume of salvage operations, utilizing in the process defective or rejected castings, as well as chips and turnings from the machine shop. Each batch intended for salvage is segregated according to its known analysis which is carefully checked by sampling after melting down into ingots.

Another interesting feature is that many molds are made with dry sand cores exclusively. Several typical examples of dry sand cores are shown in Figs. 2 to 4. Fig. 2 shows the drag and cope cores for the cyclone cylinder head which is cast in aluminum alloy. Perhaps the most noteworthy feature of this group is the development of the fin surfaces which are produced with a fine surface finish and held accurately to size and location.

Fig. 3 shows the two halves of the barrel and port core for the Cyclone cylinder head which will be found assembled in place at the right in Fig. 2. This illustration shows clearly the location and detail of the vents and gate. In Fig. 4 we have the barrel and port core, pasted, presented in side view to show the detail of the gate.

The present development of magnesium alloy castings at Wright is the result of a long program of research in the metallurgical department as well as the foundry. Table 1 gives the complete material specifications for heat-treated magnesium alloy castings, having a tensile strength of 30,000 lb. per sq. in. and a Brinell hardness of 65 after heat treating. The specification for ingots is given in Table 2.

Before machining, the magnesium alloy castings are heat treated in accordance with the specification in Table 3 which covers a number of critical points—the solution heat

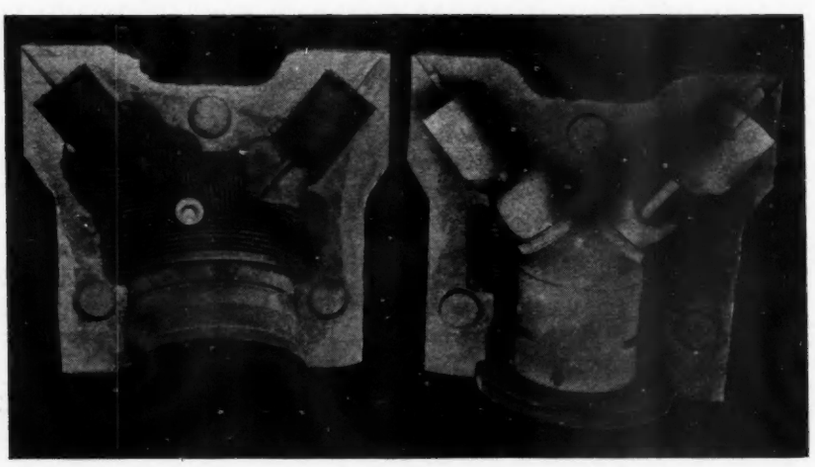


Fig. 2—Cope and drag dry sand cores for the Cyclone cylinder head.

efor Production yEngine Parts

by Joseph Geschelin
Engineering Editor, Automotive Industries

Ease of oxidation and light weight make material somewhat more difficult to cast than aluminum alloys

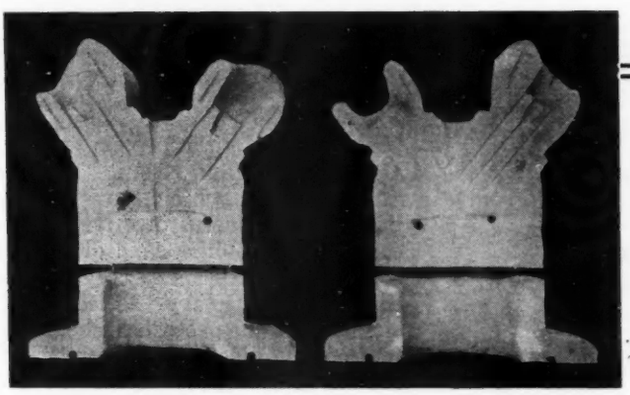


Fig. 3 — Barrel and port core before pasting shows detail of vents and gate.

treatment, cooling in air, and the precipitation heat treatment. It has been found that the castings require careful handling in heat treatment as they tend to deform easily and will bend from their own weight. Occasionally if the castings are warped or do not develop the desired physical properties after heat treatment, the original heat treatment is repeated.

It is important to note that magnesium oxidizes very easily and castings may start to burn during heat treatment. To avoid spoilage from this cause the instructions are that all parts must be free from dust and any other substance which may start to burn. It is also interesting to learn that in the opinion of the research department the electric furnace with automatic control mechanism is the only type which will give uniformly good results in this heat-treating process.

At present the following parts are being produced in magnesium alloy:

- Crankcase rear cover plate
- Covers for accessory drive openings
- Oil sump
- Oil pump body
- Air intake duct
- Supercharger diffuser
- Valve gear cover
- Accessory drive gear cases
- Intake manifold

In an effort to expand the list of applications, the research department is now producing experimentally a number of other parts which may be placed in production in the near future. Among these are the following:

- Propeller drive reduction gear housing
- Supercharger outlet and engine mounting section
- Supercharger housing
- Main crankcase section
- Oil pan

Fig. 4—Side view of barrel and port core, assembled, shows arrangement and location of the gate.

Changes in material specifications naturally affect machinability to a marked degree and necessitate radical changes in tool form. Some idea of these differences may be obtained by studying two similar operations on the same type of machine, on parts of similar character but produced of different materials. Figs. 5 and 6 show the tool forms for turning tools used on a Bullard, Fig. 5 being a Carboloy-tipped tool for turning magnesium alloy. This tool has no top rake and its form is quite different from that of the tool shown in Fig. 6, used on an aluminum alloy. It has an 8-deg. side and front rake while the nose is practically pointed, having a radius of only 1/32 in. to break the sharp edge. This tool is quite similar in many respects to tools used for turning soft brass.

The Widia-tipped tool bit in Fig. 6 is used for turning on aluminum castings. It has an 8-deg. front

TABLE 1 Magnesium Alloy Casting Specifications

1. The manufacturer shall furnish two copies of a certified report of the results of chemical analysis and physical tests on each shipment. This report shall include the purchase order number, heat number, material, part number, and quantity.

2. Castings must be true to pattern, homogeneous and free from shrinkage cracks, blowholes, sand holes, hard spots and foreign matter and must not develop defects in machining.

3. Castings shall not be repaired, plugged or welded without permission.

4. The chemical analysis shall be approximately as follows:

Aluminum	Manganese	Magnesium
10%	.1%	Remainder

5. The molten metal for test bars shall be taken from the same melt as the castings immediately before the metal for the castings is taken and cast in the same sand mixture as the castings without use of chills or artificial means of cooling. These test bars shall be cast to the standard size for testing.

These test bars when properly heat treated with the catsings shall conform to the following minimum mechanical properties:

Tensile Strength—30,000 lbs./sq. in. or 21 kg./mm^2.
Yield Point—18,000 lbs./sq. in. or 13 kg./mm^2.
Elongation per cent in 2" or 50.8 mm.—1
Brinell on castings—65

rake while the sides have a 4-deg. rake. Considerable experience has shown the necessity of specifying a top rake of 20 deg., whereas the tool for turning magnesium alloy has no top rake at all. The nose has a 5/64 radius as contrasted with practically a sharp edge in the case of Fig. 5.

New foundry problems arise when magnesium alloys are placed in regular production. In the experience of the Wright foundry it has been found that magnesium is somewhat more difficult to cast than aluminum because of the ease with which it oxidizes, also because of its low specific gravity. The foundry has learned how to guard against a number of common defects among which might be listed the following:

1. Blow holes
2. Dross spots
3. Leaks
4. Misruns
5. Rough cored surfaces
6. Flux spots
7. Core blows
8. Shrinks and cracks

In their experience defects 1, 4 and 7 are partially due to the low specific gravity of magnesium, while in general the following comments are made concerning the defects listed above. In some instances suggestions are given as to the procedure which seems to eliminate, or at least minimize, the particular condition:

1. Blow holes are often due to the fact that there is not enough pressure (due to the lightness of the metal) to force the air in the mold cavity out through the sides of the mold. This defect is minimized by using sand of a high permeability and using it as dry as possible and by the proper applications of gates and risers.

2. Dross spots or burning are due to insufficient protective chemicals in the molding sand or in the cores, failure to spray cores (surrounded by heavy sections of metal) with the protective chemical, improperly placing the screen in the sprue so that some metal runs over instead of through the screen or by using flux in the melting pot after it is too badly contaminated by dross or dirt.

3. Leaks are due to dross spots, shrinks or cracks.

4. Misruns can be eliminated by proper gating and correct pouring temperatures.

5. Rough cored surfaces are caused by letting the green cores air dry too long before putting them in the oven.

6. Flux spots are due to improperly skimming the flux back before

TABLE 2 Magnesium Alloy Ingot Specifications

1. The manufacturer shall supply two copies of the chemical analysis of each shipment and heat of material supplied. This report shall include the specification number, the quantity of material, the purchase order number and the heat number.

2. This material covers Magnesium ingot for remelting and shall be of a uniform quality, free from dross, slag, oxides, cavities or any harmful contamination.

3. The chemical analysis shall conform to the following:

Aluminum	Manganese	Copper
9.5-10.5	.10 min.	.05 max.
Nickel	Other Elements	
.02 max.	.30 max.	

4. This material when made into castings will be heat treated and any lot of material which does not respond to heat treatment will be rejected.

5. The heat number and manufacturer identification mark shall be stamped on each ingot.

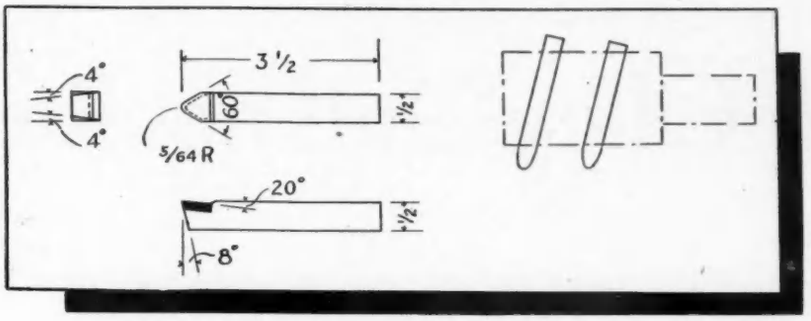


Fig. 6—(Right) Widia-tipped turning tool for cutting aluminum is shown to emphasize the difference between it and the tool form required for cutting magnesium.

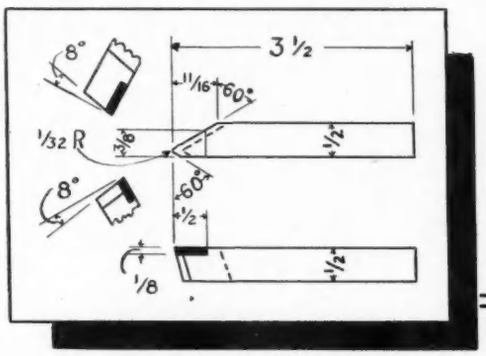


Fig. 5—(Left) Carboloy-tipped turning tool developed for cutting magnesium. Note the form and rake angles particularly the absence of top rake.

dipping the ladle or are due to trying to dip too much metal out of the furnace. As the metal floats on the flux, it is impossible to remove all the metal without getting some flux in the ladle with the metal. The difficulties due to flux are increased if the flux is not of the proper specific gravity. It should be sufficiently heavy so that the metal floats on it and only a thin skin of flux covers the metal. If the flux is too light, the flux skin on top of the metal will be too thick and will be difficult to skim back. If the flux is too heavy, it will not cover the surface of the metal and the metal will burn. The specific gravity of the flux can be altered by adding sodium chloride or barium chloride. The former lowers the specific gravity; the latter raises it. Flux spots are entirely eliminated when a tilting furnace is used, as the metal is then protected from oxidation by gas instead of by flux.

7. Core blows can be largely eliminated by using very soft cores where it is difficult to thoroughly vent cores.

8. Shrinks and cracks are due to improper use of gates, risers and chills.

Out of the experience of the Wright foundry, the following practical suggestions are made concerning foundry procedure in handling magnesium alloys:

1. As a rule the castings should be gated as near the bottom as possible.
2. The pouring temperature should be as low as practicable.
3. Chills should be made of graphite or cast magnesium.

In general, this foundry has found that foundry scrap is considerably higher for magnesium casting than for aluminum casting. However, so far as the machine shop is concerned, the percentage defective for magnesium runs about the same as for aluminum.

The foregoing is intended simply as a high-spotting of one of the most important developments in present-day foundry practice. Magnesium, because of its low weight and high strength characteristics, offers wide possibilities as an engineering material and the practical experience outlined above should contribute materially to the development of the art.

TABLE 3 Specifications for Heat Treating

1. This heat treatment applies to all magnesium castings made to this specification.

2. The castings are placed in a furnace and heated uniformly to 770° F or 410° C and held at this heat 16 hours. The castings are easily deformed at this temperature and will bend from their own weight if improperly supported. Care must be exercised when piling castings into the furnace. This is called the solution heat treatment.

3. The castings are now removed from the furnace to cool in air. Do not cool in the basket but separate the castings to permit free circulation of cool air.

4. Castings which are likely to warp should be checked at this time and straightened if necessary.

5. Reheat the castings to 350° F or 175° C and hold at heat 16 hours. Then remove from the furnace to cool. Castings cannot be straightened after this treatment. This is called the precipitation heat treatment.

6. If castings are either warped or are not to properties required after the complete heat treatment they should be retreated starting with paragraph 2.

7. If it is found that some castings are warping during machining they should be rough machined, then given another aging treatment at 400° F or 205° C for two hours at heat, then cooled in still air.

8. Magnesium will oxidize very easily and castings may start to burn while being heat treated. All parts must be free from dust, and any substance which may start to burn. The furnace should be sealed to prevent fresh air circulation.

9. The electric furnace with automatic control mechanism is the only type which will give satisfactory results. This may be a box or pit type preferably with a mechanical means of air circulation. A correctly designed furnace with uniform temperature throughout will be satisfactory without air circulation.

Olley Outlines Results of Three- to Improve Riding

Large spring deflections, knee action, precise steering, absence of shimmy and increased stability listed as advantages of independent suspension by Cadillac engineer

ONE of the largest audiences ever attending an S. A. E. technical session gathered at the annual meeting to hear Maurice Olley discuss independent suspension in a talk based on the three years' work he has done on the problem at Cadillac.

His discussion was divided into two parts, the first having to do with riding qualities and the second with ride and steering. He stated, however, that the improvement of the ride was the reason for changing the front suspension.

The reaction of the car to the road is reflected in three frequency ranges. The main range is 60 to 150 cycles per minute. The second range is 250 to 300 cycles per minute and represents the car oscillating on its tires, these frequencies being due to friction in the suspension. The third range consists of unsprung frequencies running from 300 to 600 per minute. These frequencies are not constant, due to the fact that when the wheel leaves the road the rate changes. Poor concrete or macadam excites the first range of frequencies, good concrete the second, and bad roads the unsprung frequencies. In this connection, Mr. Olley pointed out that while our paved roads look smooth, actually they are not, as climatic changes produce long waves in them which set up vibrations in the car.

In suspensions, the designer is not concerned with spring rates but with their deflections (under normal load), which depend on the rate of the spring and the weight it supports. Mr. Olley emphasized that in testing, accurate results could be obtained only with the spring in place, as shackles and the clamp at the center sometimes stiffened the spring as much as 30 per cent.

The basic frequency of a spring supporting a weight is equal to 188 divided by the square root of the deflection. Inasmuch as a frequency of the order of 80 per min. is necessary for a good ride, a minimum deflection of 5½ in. is required according to this formula.

The motion of the car body is a combination of pitching and bouncing, the frequency of the former being higher than that of the latter. On a car with deflections of 4 in. front and 9 in. rear (when the car is normally loaded), the theoretical pitching frequency should be 94 per min., while the bouncing frequency should be 63. Actual measurements on a car with these deflections gave respective frequencies of 120 and 76.

In a conventionally sprung car, pitching takes place about a center located approximately one quarter of the wheelbase in front of the rear axle, while bouncing is about a center located near the fro... bumper. The action on the road depends on the location of these centers. Striking the car at the bouncing center produces pure pitch, while striking it at the pitching center gives pure bounce. Due to the proximity of these centers to the axles, when the front axle strikes a bump, the motion produced is mostly pitching, and subsequently when the rear axle strikes the bump, bouncing action is produced. The higher frequency pitching begins first and later combines with the lower frequency bouncing. Both motions are simple harmonics. In this connection, Mr. Olley said that adding load did not affect the pitching frequency but did influence the bouncing period.

As the front springs are softened, the pitching center crawls forward toward the center of gravity, while the center of bounce moves forward very rapidly. At the same time, the pitch frequency declines rapidly but the bounce frequency decreases but little. The effect is to improve the boulevard ride, provided damping and friction are reduced. When front and rear spring deflections are equal, the bounce center is at infinity and the pitch center at the center of gravity. Under these conditions, bouncing is a pure up-and-down mo-

In this issue Automotive Industries completes its presentation of digests of papers presented at the Annual Meeting of the Society of Automotive Engineers held in Detroit last week. The presentation begins on this page with a summary of the paper on independent suspensions presented by Maurice Olley, Cadillac, which was one of the outstanding features of the meeting.

Year Research Qualities

Maurice Olley whose talk on independent suspensions at the S.A.E. Annual Meeting was heard by the largest audience attending the technical sessions.

tion without rotation. Further softening of the front springs results in a forward movement of the pitch center away from the center of gravity, and the bounce center reappears at the back of the car, moving inward as the front springs get softer. Under these conditions, when the car passes over a bump, the slower bounce frequency begins first and the higher pitch frequency later. The front end is then susceptible to bounce and the rear to pitch. A flat ride is obtained with equal spring deflections front and rear and for some range beyond.

Obviously, the relation between front and rear spring deflections depends on the load in the car. Mr. Olley stated that the most desirable relationship was to have front and rear deflections equal under full load conditions and to make the rear spring deflection 70 to 80 per cent of the front for light load.

The effect of a passenger entering a conventional car is to reduce the bouncing frequency without changing the pitching period, which makes the interference kick worse when the two vibrations combine. On the other hand, passengers entering a car having front springs softer than the rear improve the ride.

Generally, lowered frequencies improve the ride and, moreover, these lower frequencies need less damping. When it comes to reducing them, the deflection of the rear spring cannot be decreased, so it is necessary to reduce the stiffness of the front suspension to about one-third, giving a deflection of 8 to 11 in. One way of doing this, perhaps not the only one but certainly a good one, is by independent suspension, Mr. Olley said.

Independent suspensions have six outstanding features. First they permit relatively large spring deflections with frictionless springs. As deflection increases, damping and friction must decrease, especially friction, as otherwise the ride will be bumpy rather than soft.

The second feature listed by Mr. Olley was knee action, which permits either wheel to pass over an obstacle without disturbing the path of the other, or throwing the car sideways.

The third feature is that precise steering may be obtained, as the path of the wheels is invariable. In this connection, Mr. Olley said that an error of one degree in the path of the front wheels at 100 m.p.h. would overturn a 12 ft. wheelbase car.

Fourth, despite the extremely soft springing, absolute freedom from shimmy may be obtained, provided frame and body assembly is stiff enough. The torsional frequency of the car must be held above 800 to avoid troubles, as if it gets down to 600, oscillation will develop.

The increased roll stability is the fifth feature, the independent suspension being more than a third better on this score than the "axle car." The critical deflection is about 30 in. on an independently sprung car, while it is about 17 in. with an axle. The roll angle starts increasing much faster than the deflection at about 4¼ in. for a front-axle car and at about 10 in. for a car with parallel-action independent suspension. Consequently, if deflections of the order of 8 or 9 in. are in question, the independent suspension has a great advantage.

The sixth feature listed by Mr. Olley was the inherent stability of steering. He said the car was pushed around the corner by the road, and the centripetal force needed to get the car around the corner was only obtainable by the front and rear wheels slipping sideways on the road. The angle of slip is proportional to the side load, decreases as tire pressure increases, and is independent of both speed and load. He said that the Ackerman layout applies only at walking pace and told of a 120 in. wheelbase car making an 800 ft. radius turn at 60 m.p.h. The slip angle in this case was 4 deg. and the center of the turn was 46 ft. ahead of the front axle, the rear wheels tracking 8 in. outside of the front.

The side thrust is applied back of the center of tire contact, giving a twist around the king-pin tending to straighten the wheels. Although the side thrust is constant, the torque around the king-pin increases directly with load and reaches values of 1000 to 1500 lb. in. This self-righting action accounts for safe driving with negative caster.

In a parallel-action independent suspension, the wheels roll with the car, decreasing the side thrust slightly and increasing the torque. Mr. Olley compared this action to that of a bicycle, and said that it gave incomparable handling on icy and wet streets, and also complete safety in the event of a front or rear blowout. He said attempts had been made to get this with front axles by faking the geometry.

The thrust due to camber is proportional to load, but the thrust due to slip angle is not. Consequently, the stability effects should be expected to increase with car size, and they do.

Although tire wear probably is greater with independent suspension while cornering, under other conditions of running, it should be less. Under fixed track conditions, more tire wear may be expected on the outside edge of the tread. Scalloping, however, will be less.

During all the developmental work, no spring breakages were encountered, and endurance tests indicate that the life of the coil design is twice that of the leaf spring it displaces. The spring steel used is a silico-man-

ganese alloy. As to pin wear, Mr. Olley said there would be none if the pins were hard.

The foregoing summary of this interesting and important talk is admittedly sketchy as it is based on notes made by the writer at the session and on the topical outline which Mr. Olley used as a guide. As the speaker said, his talk itself was a resume since, in the time available, it was impossible to do more than summarize the results of three years of hard work. Consequently the report presented here is really a summary of a summary. Moreover, in the time available, it was impossible to reproduce the sketches with which Mr. Olley illustrated his points, nor has it been possible to include the wit with which the speaker enlivened his presentation.

In the discussion which followed, James Crawford, Chevrolet chief engineer, who presided at the session, said in response to a question that among the reasons for using a different type of suspension on Chevrolet and Pontiac than on other General Motors' cars, were the lesser weight of these cars; the fact that they could be serviced on an exchange unit basis, and because both Chevrolet and Pontiac cars are put together at assembly plants. In connection with the last point, the "knee-action" unit can be manufactured and assembled to desired standards at a central point and then shipped complete ready for installation at the assembly plants. Although Mr. Crawford did not refer to tool costs, it is understood that the more expensive tooling required for the Chevrolet-Pontiac design also was a factor.

E. P. Lubricant Testing Machine to Be Built to Standards Bureau Design

Will Be a Self-Contained Unit and Is Arranged for Wear and Friction Measurements

AN outline of the work done at the Bureau of Standards in developing test methods for various properties of extreme-pressure lubricants was given in a paper by Oscar C. Bridgeman. The work was done under the sponsorship of the S.A.E. Lubricants Research Subcommittee.

The first problem tackled was to develop a machine for determining the load-carrying capacity of different lubricants on the market. Tests with various lubricant-testing machines available showed that no two of them rated the nine lubricants used in them in the same order. It was concluded that the major reason for the unsatisfactory results with these machines was that the ratio of pressure to applied load changed during the test run as the result of an increase in contact area caused by wear. An experimental apparatus was therefore built at the Bureau of Standards in which this defect is eliminated. It consists essentially of two self-aligning rolls acting under load and so mounted that each can be driven independently. With this arrangement it is possible to vary both the absolute and the relative speeds within wide limits. Provision is made also to apply the load at various constant rates.

On the basis of experience with this first machine, an improved machine has been designed, of which a number will be built. This machine is self-contained and is so arranged that wear and friction measurements can be made with it, a small dynamometer being needed as an accessory for friction tests. The speed of the faster roll can be varied from 750 to 3000 r.p.m. in five steps, and for each speed of the faster roll the speed ratio between it and the slower roll can be varied from 60 to 6.7 in five steps. The rate of loading can be varied between 20 and 350 lb. per sec. per in. of linear contact between rolls. All gears are built into the machine, and gear changing is automatic. The rolls (or test specimens), which are similar to the cups of roller bearings, are readily obtainable.

Authorization has been granted for the construction of a number of these machines. These will be distributed among interested laboratories for cooperation with the bureau in its research work, to check the conclusions which have been reached by the bureau on a more extensive line of h.p. lubricants.

Pending the construction of the research machines and the standardization of a routine testing machine and method, the Subcommittee has arranged with the bureau to have tests made for interested parties on the existing experimental machine. This testing is done on a cooperative basis with the Lubricants Research Subcommittee.

While development of test methods for load-carrying capacity and for the determination of the coefficient of friction are thus well under way, little has been done as yet on methods for the determination of the tendency to cause wear and of the stability of the lubricant and of its corrosiveness (if any). The part of the work still uncovered was outlined by Mr. Bridgeman as follows:

(a) Cooperative work on the new lubricant tester with a wider variety of lubricants and the standardization of a routine test apparatus and method for the measurement of load-carrying capacity.

(b) Completion of the investigation of coefficient of friction, abrasiveness under light load, and stability of load-carrying capacity and standardization of significant test methods for these properties.

(c) Investigation of wear under heavy load, stability of the lubricant as regards thickening, and corrosiveness, leading toward the development of test methods.

An Interesting Sidelight On Engine Noise

A 100 hp. engine is only .0214 per cent efficient as a producer of sound, which is much too efficient to suit those automotive engineers who have to worry about suppressing noise. This interesting sidelight was brought out by R. F. Norris of the C. F. Burgess Laboratories at the Noise Symposium at the S. A. E. Annual Meeting. According to Mr. Norris, the sound output of such an engine is about 110 decibels, equivalent to a half watt-hour of energy while the energy input in the fuel is 223,800 watts per hour.

Further Increases in Specific Output Hinge on Raising Volumetric Efficiency

Analysis made by Janeway and Baker indicates present engines are close to "par" thermally

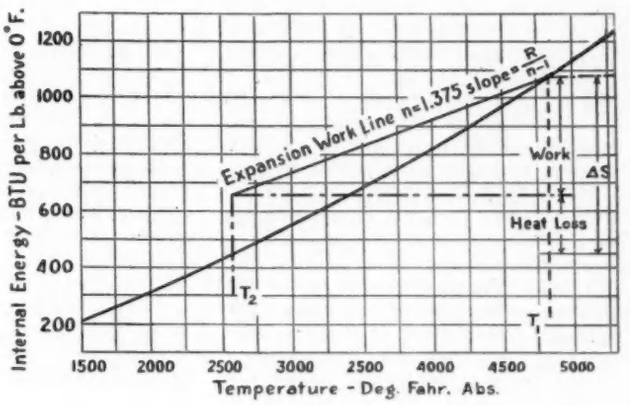


Fig. 1 — Temperature - energy chart for expansion of combustion products.

IN the efforts to further increase the specific output of four-cycle internal combustion engines it has become apparent that a statement or an equation specifying the maximum performance obtainable under optimum practical conditions would be of great help. In the past, the air-cycle efficiency sometimes has been held out as a goal toward which the engine designer should strive, but it was pointed out by R. N. Janeway and L. R. Baker in a paper presented by them at the S.A.E. Annual Meeting that air-cycle efficiency is based on the assumptions of adiabatic expansion and compression and constant specific heat of the working medium throughout the temperature cycle, equal to the actual specific heat at atmospheric temperature, both of which conditions are far from being attainable in an actual engine. The authors in the investigation on which their paper was based set themselves the task of determining the maximum specific output which can be obtained in an actual engine considering the variability of specific heats, the loss of heat to the combustion chamber walls, and the compression ratio employed, both for the case of the normal volumetric efficiency at full load and for the somewhat hypothetical case of 100 per cent volumetric efficiency. In this way they set up a "par value" or a limit of the attainable toward which engine designers should work.

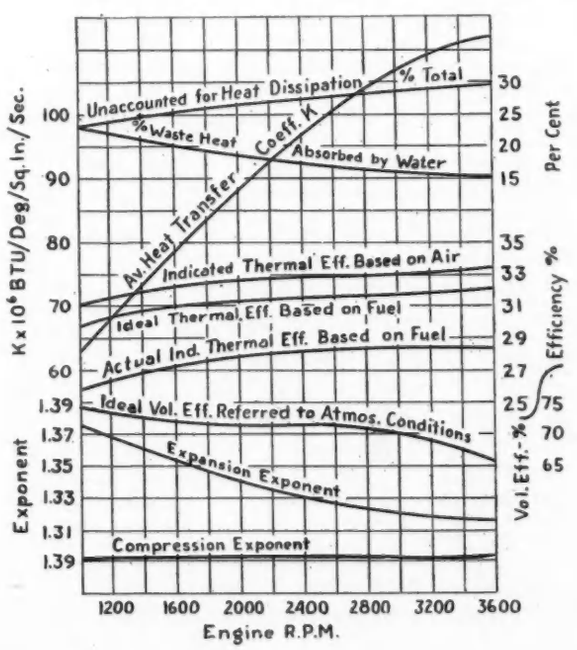


Fig. 2—Comparison of analytical results with actual performance (eight-cylinder L-head 3¼ by 4¼-in. engine with 5.4 compression ratio)

According to the air-cycle theory, efficiency depends only on the compression ratio [$e = 1 - (1/r)^{0.4}$], but when the variability of the specific heats is considered it becomes obvious that the amount of heat added per unit of the working medium becomes a factor, since this determines the temperature range. For instance, with a compression ratio of 5 and a heat addition of 900 B.t.u. per pound of gas, instead of an air-cycle efficiency of 47.5 per cent, we get an efficiency of only 41.0 per cent by merely considering the change in specific heat of air, and an efficiency of 38.5 per cent by considering the actual working medium (gases of combustion). The heat addition of 900 B.t.u. is said to be somewhat less than the heat content of a maximum-power gasoline-air mixture.

Referring to Fig. 1, the work done per lb. of gas between any two temperatures T_1 and T_2 is $R/(n-1) \times (T_1 - T_2)$, where R is the gas constant, that is, the work in B.t.u. done per pound per degree changes in temperature at constant pressure. As shown in the figure, if a straight line is drawn from the point on the curve

at T_1 with a slope equal to $R/(n-1)$, the difference in the ordinates to the line at T_1 and T_2 represents the work done. If the drop in intrinsic energy is greater than the work done, the difference represents heat lost; if it is less, the difference represents heat addition. Therefore, if the initial temperature T_1 and the volume change V_2/V_1 are known, T_2 can be calculated and the work and heat loss can be readily obtained for any exponent.

The problem of limiting efficiency hinges on the correlation of compression and expansion exponents with heat losses. This is a very involved problem, since each factor known to influence heat transfer from a gas to a surrounding surface is subject to continual change throughout the cycle. Gas temperature and cylinder surface change from instant to instant, and the coefficient of heat transfer, sensitive as it is to turbulence, is entirely obscure both as to mean value and possible variation during the cycle.

In determining the heat losses the authors make use of graphical integration. They first determine the variation of the gas temperature throughout the expansion stroke for various exponents of the expansion line and the variation of the exposed surface during the same period. The heat loss, of course, depends also on the mean temperature of the combustion-chamber wall. This also varies from point to point and from instant to instant, but, fortunately, owing to the great difference between gas temperature and wall temperature, any moderate inaccuracy in the determination of the wall temperature does not affect the final result greatly. It was decided to use 300 degrees as the mean temperature of the wall surface under full load over the whole speed range.

Curves are next drawn of the product "exposed surface temperature difference" for both the compression and expansion strokes. The curve for the compression stroke brings out the fact that in this particular engine, with 5.4 compression ratio and under full load, the gases are lower in temperature than the cylinder wall during the first 70 degrees of crank motion from the beginning of the compression stroke, during which period heat is absorbed from the walls, while during the remainder of the stroke the gases are hotter than the walls and heat is lost to the latter. The curve for the expansion stroke indicates that the rate of heat transfer is almost uniform throughout the stroke, the decrease in temperature difference toward the end of the stroke being compensated for by the increase in exposed surface.

The authors also discuss the effect of unvaporized fuel in the mixture at the beginning of the compression stroke, on the temperature and pressure of compression. They state that if, while the compression pressure is being determined with the engine compressing air only, if the fuel is then turned on there is an immediate and considerable drop in pressure, due to energy consumed in the vaporization of the gasoline. As a matter of fact, it is impossible to approach the true compression pressure without an accurate indicator, and even then the card must be taken at the same instant at which ignition is turned off.

For evaluating the heat-transfer coefficients, the authors took the test results from an eight-cylinder 3¼ by 4¼-in. engine of the L-head type with a compression ratio of 5.4. The engine was run on the dynamometer under full-torque load over the speed range 800-3600 r.p.m., the heat dissipation being measured. For each speed the i.m.e.p. was calculated from the load torque and the friction torque. Next, the air required to produce the indicated output under conditions of optimum efficiency was calculated, and from this the theoretical volumetric efficiency was determined. The results as to total heat transfer are highly sensitive to the assumed volumetric efficiency, restricting the possible range of values which will give a reasonable total heat loss in relation to the measured heat dissipation.

The estimated mean coefficients of heat transfer derived for compression and expansion are shown in Fig. 2 over the speed range. While the trend of the curve is seen to be typical of observed variations in heat transfer coefficient with velocity, the characteristic can be better defined by plotting the points on log—log coordinates. In transferring the points to the log-log sheet of Fig. 3, the product of r.p.m. and corresponding volumetric efficiency was used as abscissa, instead of r.p.m. alone. This brings the basic charge density into the picture.

Plotted on this basis, the four points determined in the analysis plainly lie on a straight line of slope $= 0.526$, defining the law of variation to be $K = a\,(NV)^{.526}$, where $N = RPM$, and $V =$ volumetric efficiency. The value of a corresponding to the absolute values is 2.33×10^{-6}.

In Fig. 3 the derived engine values are compared with experimental data obtained by R. Royds in tests on compressed air flow in pipes. The three lines represent results obtained at different constant air pressures, respectively, 15, 35, and 55 lb. per sq. in. abs. It will be observed that these results, plotted against the product of velocity and density, or lbs. per sec. per sq. ft. passage area, show close agreement for the three air pressures, and a slope varying from 0.578 to 0.615.

This correlation of the derived coefficients with experimental values indicates that the results are in the range of probability, according to Messrs. Janeway and Baker.

That the compression exponent arrived at in the analysis and shown in Fig. 2 is practically constant over the speed range is accounted for by its closeness to the adiabatic value. The estimated value is 1.293. The mean adiabatic exponent, as defined by the temperature-energy curve over the same range of temperature, is 1.307.

The expansion exponent, on the other hand, is shown to be quite sensitive to speed, falling from 1.375 at 1000 r.p.m. to 1.317 at 3600 r.p.m. The corresponding mean adiabatic exponent for the temperature range of expansion is 1.24 to 1.26.

The falling off in the exponent with increase in speed is a direct result of the failure of the coefficient of heat transfer to increase in direct proportion to speed. Since the duration of the stroke decreases in proportion to the increase in speed, the net heat loss per stroke is reduced, so that expansion approaches closer to the adiabatic condition. This tendency is also responsible for the increase in thermal efficiency as the speed goes up, from 29.7 per cent at 1000 r.p.m. to 32.1 per cent at 3600.

Fig. 4 shows the results obtained by applying the coefficient of heat transfer law derived in Fig. 3 to the condition of 100 per cent volumetric effi-

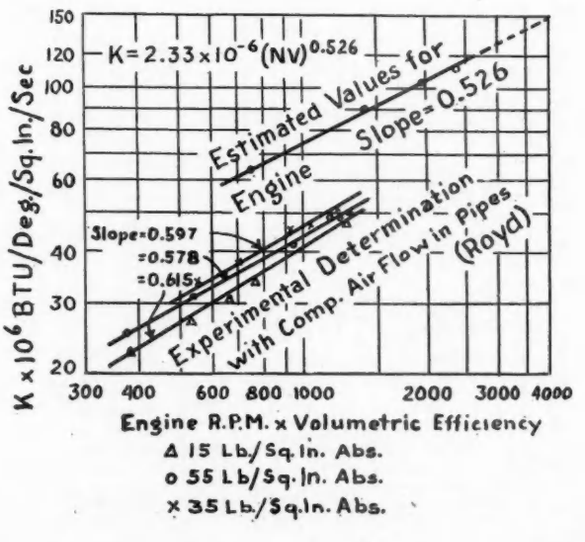


Fig. 3—Variation of coefficient of heat transfer with speed and density of gases

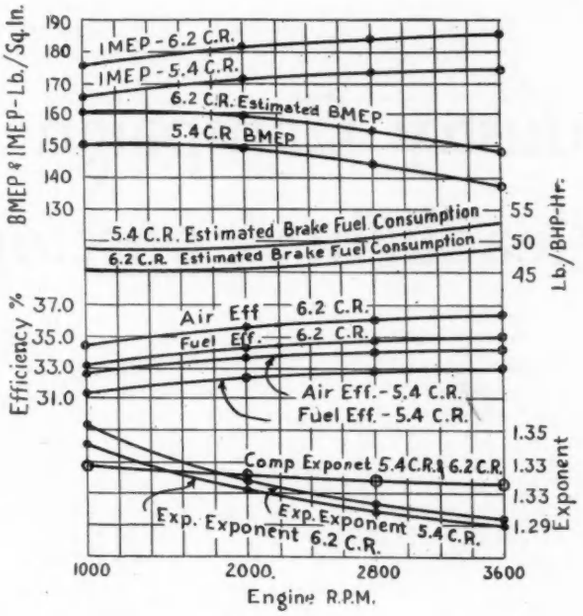


Fig. 4—Calculated performance for 100 per cent volumetric efficiency (eight-cylinder L-head, 3¼ by 4¼- in. engine, 14.7 lb. per sq. in. absolute pressure and 60 deg. F. atm. temperature)

ciency at all speeds with standard atmospheric temperature and pressure (60 deg. F. and 14.7 lb. per sq. in.).

The outstanding result is the output obtained as the probable expectation under this condition. It will be seen that at 5.4 compression ratio the i.m.e.p. is 166 lb. per sq. in. at 1000 r.p.m., increasing to 175 lb. per sq. in. at 3600 r.p.m. under the influence of a corresponding increase in limiting fuel thermal efficiency from 31.5 per cent to 33 per cent.

This represents an increase in i.m.e.p. over that of the actual engine maximum at 2800 r.p.m. of about 47 per cent. If we deduct the frictional loss, assuming it to be unchanged, we find that the increase in brake output becomes 62 per cent, corresponding to a b.m.e.p. of 145 lb.

Part of this gain in output is contributed by an increase in limiting cycle efficiency of from 6 per cent at 1000 r.p.m. to 3 per cent at 3600 r.p.m. This gain is traceable to the fact that the heat losses are reduced relative to the energy liberated. Although the coefficient of heat transfer increases somewhat due to higher charge density, it does not overcome the reduced ratio of surface to weight of charge. This is also reflected in somewhat lower expansion exponents than were obtained with the normal volumetric efficiency.

It is of interest to note that the compression exponent is actually somewhat higher than the adiabatic value over the speed range. This is a result of the assumed charge temperature of 60 deg. F. which results in net heat addition from the walls to the mixture during compression.

The net result of the increase in volumetric efficiency on calculated total heat loss is comparatively small, because the temperature difference between gas and walls during combustion and expansion increases relatively much less than does the charge weight.

The following itemized summary shows the comparative heat losses calculated for both conditions of volumetric efficiency at 1000 r.p.m.:

Period	BTU/min. Heat Loss 75% V.E.	BTU/min. Heat Loss 100% V.E.
Compression	30	—40
Combustion	266	271
Expansion	1109	1378
Exhaust	246	207
Total Calculated	1651	1856
Unaccounted for	499	499
Total Heat Dissipation	2150	2355

The estimated total heat dissipation is thus less than 10 per cent greater for a 50 per cent increase in output.

The results of calculations for 6.2 compression ratio and 100 per cent volumetric efficiency are also included in Fig. 4. It will be seen that the i.m.e.p. and efficiency curves parallel those for 5.4 compression ratio and give values about 6 per cent higher at all speeds.

The gain due to this increase in compression ratio is of about the same order as actually obtained in practice. Taking the actually observed friction in the engine at 2800 r.p.m., the maximum b.m.e.p. at 6.2 compression ratio with 100 per cent volumetric, would be 156 lb. per sq. in.

Higher Compressions Increasing Resistance of Spark Plug Gap

PROBLEMS and tendencies in electrical equipment were discussed in a paper by J. T. Fitzsimmons of the Delco-Remy Corporation. One of the most interesting points brought out in the paper is the rapid increase in spark voltages required with compression ratio. On this point the author had the following to say:

"One tendency indicated in some of the new high compression engines is the evidence of an unusually high resistance to the passage of the ignition spark across the spark plug gap in the engine cylinder. On most engines, such as were in use a year or two ago, with compression ratios not over 5 to 1, it was much easier for the spark to jump the gap at the plug than to jump the same gap in air. This was not only due to the electronic emission of the heated spark electrodes, but also to the fact that the resistance of gaseous mixture under compression, in the proportion to give best power in the engine, is much lower than that of air at atmospheric pressure. On some of the newer engines with compression ratios of from 5.5 or 6.25 to 1, it has been found that ten or fifteen times as high a voltage is required to jump the gap at the plug as was the case with those engines of lower compression ratios. This high resistance to the passage of the spark across the plug does not necessarily occur at the speed or throttle opening giving maximum compression in the engine cylinder. In many cases, however, at the point this condition occurs, the combustion seems unstable and the engine tends to become somewhat rough. On present engines, the manufacturer does not necessarily have to clean up this condition, since, with the flexible engine mountings, it is not objectionable to the car driver and passengers.

Without discussing this phenomenon in detail, it may be well to state that the evidence at present leads us to believe it is due to the stratification of mixture in the engine cylinder, this mixture in the zone surrounding the spark plug being so lean as to be almost non-combustible, at the time the resistance to the spark is the highest. If our theory is correct, it is possible that as development is carried out more thoroughly, resulting in better combustion chamber-shape, spark plug location and gas distribution, the problems in firing these engines will be lessened, but if this is not the case, ignition systems capable of furnishing a longer spark must be supplied."

Falge Urges Industry Campaign to Make Public Headlight Conscious

AFTER outlining the headlighting problem and tracing the development of headlighting practice, R. N. Falge, research engineer of the Guide Lamp Co., in his S.A.E. Annual Meeting paper detailed the present situation. He said in part:

"The legislative and administrative situation is badly in need of attention. There are a few states in which the laws specify the single-beam practice, where an honest and sincere effort is being made at enforcement. There are other states in which the laws specify the single-beam practice, where no serious effort is being made at enforcement. There are still other states where the laws specify the multiple-beam practice, but in no such state is the law supplemented by educational work and enforcement.

"Unenforced single-beam legislation is a decided menace to safety and progress. It leads to all of the ills of the multiple-beam practice without its compensating features. A fundamental single-beam requirement is that headlamps be maintained in highly accurate adjustments. Lacking enforcement, the natural tendency on the part of the average motorist is to aim the driving beam high enough to see obstacles and turns at a safe distance ahead; in other words, in accordance with the multiple-beam practice. When such aiming is permitted, it is obviously wrong not to require the use of the lower beam in passing. Where enforcement is lacking the law should specify the multiple-beam practice.

"The headlamp service situation presents a peculiar problem. Here, during these years of depression, we see a potential market involving millions of dollars in profit every year, almost totally neglected in all but the few states where single-beam enforcement is active.

"A fundamental principle which appears to have been disregarded in past efforts to promote proper headlamp adjustment and usage is that the demand for maintenance service originates largely with the service man. Given reasonable assurance that one could give a customer value for his money and make a fair profit on the deal, there appears to be no good reason why the average service operator should overlook this opportunity.

"The difficulty appears to arise from the fact that average service adjustment justifies only a nominal charge as compared to the time and expense involved in doing a good job. Occasional sales of bulbs, lenses and reflectors help, but not enough to make the job really attractive. What is needed is a relatively inexpensive line of generally applicable replacement parts designed to make available on cars the newer lighting features as they appear on succeeding models. This is a matter which is receiving attention.

"Another difficulty is the need for providing a space about 40 ft. long and 8 ft. wide, darkened at one end, in which to do the job. Few service stations can afford to keep such a space available at all times for this purpose. Also, mechanics must be familiar with the variety of headlamp designs on cars, single-beam, dual-beam, three-beam, and four-beam units, fixed-focus, single-focus, and double-focus types, which have been marketed at various times. An obvious need is a simple and fool-proof device which will serve to adjust any and all headlamps within the space normally available ahead of a car. This is a problem which is receiving careful attention.

"With service stations in a position to provide satisfactory service on a sufficiently profitable basis to interest them in bringing this feature to the attention of their customers, a major deficiency which has served very effectively in the past to discourage headlamp adjustment and maintenance will have been eliminated.

"What we need now is an intensive educational campaign designed to familiarize the motoring public with the advantages in the proper maintenance, adjustment and usage of the headlamps which we have made available on their cars. The facts brought out in this paper were presented to the National Safety Council at its annual meeting in October by its Headlighting Committee, with the recommendation that that organization interest itself in the educational side of the program. Recognizing its responsibility in this field, the National Safety Council, with its many contacts throughout the country, agreed to supervise such an intensive educational campaign provided it could be assured of the full support of the automotive industry in helping to distribute the information and in absorbing its fair share of the expense."

Tentative Specifications Developed for Direction Signals by S.A.E. Group

IN addition to discussing headlighting and other forms of lighting which have been a feature of cars in the past, W. C. Brown and V. J. Roper of Nela Park Engineering Department, General Electric Co., dealt with luminous marks for the exterior of the car and with signal lights. They stated that a sub-committee of the S.A.E. Standards Committee had experimented at length with marker lights, at proving grounds and on highways of various types, and had reached the following conclusions:

Marker lights are desirable for three purposes:

(a) As markers showing to the *front*, to give a better indication of the width of the car in passing. They offer a decided advantage when one headlamp is out, especially when meeting on curves.

(b) As markers showing to the *sides*, to show the dark side of the car when approached from the side.

(c) As markers showing to the *rear*, to give an indication of car width, speed, and distance, when approached from the rear. A marker on the right side at the rear establishes the right boundary of the road for the driver in the rear. When approaching glaring headlamps behind a car equipped with two rear

markers, the unit on the right does not fade out as does the usual tail-light on the left of the car. Also there is protection in the event of burnout of one rear lamp.

A subcommittee of the Standards Committee also has established tentative specifications for direction signals, which are based upon the premise that the signal, to be effective, must *attract* the attention of the following driver. This is quite a different matter from merely being visible when one has fixed his attention upon it. The signal occupies only a small part of the field of view and its background is a haphazard pattern of brightness and color. Only a fraction of the driver's attention is devotable to the signal on the car ahead, and the latter must impress itself on his attention in a fraction of a second if it is to be effective. Therefore, the signal must have a brightness greatly above its surroundings if it is to prevent adequate protection.

Since the importance of insuring that a turn signal shall be noticed is even greater than in the case of a stop signal, the added attracting power of flashing action is needed. No mechanical movement of a low-brightness object, whether lighted from within or without, can approach in attention-compelling power a brilliant flash of a self-luminous signal. It should be pointed out that a signal that has a brightness adequate for all daytime conditions will of necessity present some irradiation at night, tending to blur any letter, character, or device such as an arrow, unless such arrow be very large. Some other convention must be depended upon for the general development of direction signaling. The simplest is that of having a right signal flash for a right-hand turn, a left signal flash for a left-hand turn, and both signals burn steadily for a stop indication only. The desirable speed of flash is from 100 to 150 cycles per minute, the filament of the bulb being "on" approximately twice as long as it is "off."

A direction signal must be turned on by the driver, as any switching mechanism actuated by the turning of the wheels is too late to be effective. The signal should be turned off automatically, by the movement of the steering mechanism in straightening out after making the turn, or by a timing device. Where the driver must take a definite action, as in turning on a directional signal, it is very desirable that there be some form of indication to him that the signal is operating. This can be audible or visual. A simple means is a small indicator lamp or lamps which duplicate the signal operation in view of the driver and show definitely that the signal is operating. These can be connected so that a 6-8 volt indicator bulb can be used.

Light Load Operation in Cold Weather Is Biggest Wear Cause

"IF I were to pick the one item that causes the greatest wear on the greatest number of cars, I believe it would be operating engines at too low a temperature, with too light a load factor," said J. B. Fisher, chief engineer of Waukesha Motor Co., in his paper on Engine Design from a Wear and Maintenance Viewpoint. He went on to say that cars which show excessive wear are all too frequently ones that operate almost entirely in city service, with a mileage of 40 or 50 a day. They are subjected to frequent starts and stops, and long periods of idling.

Following are suggestions made by the author as to what features designers can provide to eliminate or minimize the wear due to unfavorable operating conditions:

Manifolds that will idle over protracted periods without loading and even give higher mixture temperatures when idling for a few minutes for the frequent stops in city traffic.

Temperature control on the cooling system to insure minimum jacket temperatures of 170 deg. F.

Starting aids that will eliminate the abnormal conditions encountered in the morning start in zero weather.

Means for keeping the oil hot in zero weather—either by means of heat from the cooling water or possibly subpans for extreme conditions.

Materials for cylinders, pistons, rings, crankshaft and piston pins which will be more resistant to corrosion than average materials. In this connection Mr. Fisher referred to alloy irons which show much greater resistance to corrosion than ordinary cylinder liners. Some of these have come into use abroad as dry liners which are installed when new pistons are required, and in some cases as original equipment.

Axle and transmission ratios that will keep the engine loaded as heavily as possible and reduce operation under light loads to a minimum.

One very successful bus operator installs a vacuum gage on the dash and the dial has that portion from 3 to 15 lb. colored red. The drivers are instructed to keep out of the red range as much as possible, by using suitable gear ratios. Mr. Fisher said he did not advocate the use of a similar gage on passenger cars, but cited it as a case for more favorable engine loading.

Wear of valves, guides and seats is a responsibility of the designer. Location of the valves with relation to one another and the cylinder barrel is possibly one of the most important decisions of the designer, yet designs are met with continually in which valves are so close to the cylinders that deformation of valves and bores adjacent to the ports is bound to show up quickly.

Lubrication of exhaust-valve stems and guides must be properly provided for, and when an engine is suddenly stopped from top speed under full load, oil must show well up to the top of the guides if wear is to be avoided.

Exhaust valves are often far too large; they can profitably be made 60 per cent of the diameter of the inlet valve, without loss in power and with a vast improvement with respect to exhaust-valve temperature. The exhaust-valve temperature is the controlling factor determining the maximum permissible compression ratio, and the highest practical compression ratio should be used.

Wear of main and connecting rod bearings is dependent mainly on the factors of speed, deflection, and dirt. At excessive speeds the best of high-grade babbitt bearings have their limitations. In case of trouble, the designer can resort to lead-copper and cadmium-base metals, which will stand more severe punishment at high temperatures. In the rod bearings, particularly, the thin precision bearings with copper-lead linings have shown up to advantage.

The average engine has very little lateral stability in a horizontal plane in line with the crankshaft, and this lack of rigidity produces highly localized bearing loads on the ends of the main bearings. The lower flanges

on the case should be from 2½ to 3 in. wide, instead of 1¼ to 1½ in., and heavy rectangular box-sections 3½ or 4 in. square are none too heavy to reduce deflection to a minimum.

Mr. Fisher criticised inadequate air cleaners and oil cleaners, some of which latter, he said, clog up and by-pass some of the oil in less than 5 hours' time. The oil cleaner preferably should be able to function properly without attention for at least 10,000 miles. The selection of air-cleaner equipment is a difficult task, owing to the different requirements in various parts of the country. "Let the designer drive his product mile after mile over Idaho roads with dust 8 or 10 in. deep, or through a California Santa Ana sand storm, which removes the finish from the car like a first class job of sandblasting—and his perspective on air-cleaning will undergo a remarkable change."

"Wear of cylinders and pistons caused by dirt and dust," Mr. Fisher observes, "can be combated successfully only by eliminating the cause. Very hard irons, hardened steel, and even nitralloy offer little resistance to abrasives."

Another cause of rapid cylinder wear is the explosion pressure getting back of the top ring and forcing it out against the cylinder wall. This sort of wear is particularly severe in engines which are subject to frequent and rapid applications of the load, as in city bus service. Some special rings (wafer rings, for instance) neutralize this wear in large measure, apparently because the total downward pressure on the upper face is far more than the total pressure back of the ring.

Laboratory Tests Measure Headlamp Performance

TESTS on headlamps to determine their endurance in service and other characteristics of performance were the basis of a paper prepared by Professor L. Boelter of the University of California and D. O. Rusk, formerly also connected with that institution. Derangement of the headlamps in many instances is due to excessive vibration. This may be excited either by engine vibration or by road shocks. According to the authors, vibration of the headlamps excited from the engine will be a minimum if their mountings are relatively flexible, whereas consideration of excitation by road shocks calls for a relatively rigid mounting.

Among the conclusions reached by the authors are that the mechanical performance (by which they evidently mean resistance to deterioration from vibration) of headlamps has improved greatly during the past several years, and that laboratory tests involving durability, vibration, and dust- and moisture-leakage determinations may be used to advantage in predicting road performance. Abundant photometric data and tests on two psychologic subjects indicate that 0.07 foot-candle at 100 ft. is the criterion of glare. This latter result is in substantial agreement with that of the 1918 Pelham Parkway and White Plains tests, on which the limit of 800 apparent candle power at the point D of the field of illumination was based.

Steering Stability Improved by Increasing Weight on Front Wheels

QUANTITATIVE results showing how four-wheel drive and added weight on the front axle tend to reduce skidding were presented by Walter A. Olen, president and general manager of the Four Wheel Drive Auto Co., Clintonville, Wis., in connection with his S. A. E. paper on Front Wheel Stability in the Interest of Public Safety. Tests were conducted in loose snow, 4 to 6 in. deep, and consisted in driving four-wheel and rear-wheel drive trucks at constant speed with the front wheels cramped 24 deg. to the left. The results of the test follow:

Four-Wheel Drive Truck

Speed, 22 m.p.h., 24 deg. cramp angle, 40 per cent of weight on front wheels.

	Turning Circle Diameter
True	57 ft.
Four-wheel drive	65 ft.
Front-wheel drive only	72 ft.
Rear-wheel drive only	95 ft.

Rear-Wheel Drive Truck

Speed 21 m.p.h., 24 deg. cramp, rear-wheel drive.

Per Cent Load on Front Wheels	Turning Circle Diameter
True	72 ft.
31 per cent	200 ft.
20 per cent	300 ft.
11.5 per cent	400 ft.

These and other tests, Mr. Olen asserted, tend to show that when there is too little weight on the front wheels, steering is apt to be uncertain. This is especially so in the event of rapid acceleration in low gear, which transfers additional weight from the front to the rear wheels.

That the minimum proportion of weight on the front wheels should be limited, for the sake of safety, has been recognized by the State of Connecticut, which places this limit at 20 per cent.

Legislation in recent years limiting the load which can be placed on any one axle has tended to cause designers to shift more weight onto the front axle. Here again a limit is imposed by the fact that the effort required in steering increases directly with the weight on the front axle. The limit of load which can be placed on the front axle without resorting to power steering has been variously estimated at from 9000 to 10,000 lb. Mr. Olen states that tests have shown that when the steering wheels also serve as driving wheels (in addition to the regular rear driving wheels), the load on both axles may be increased by 14.2 per cent without increasing the steering effort required.

A further series of tests quoted by the author indicates that it is desirable to have full and free differential action between all of the wheels of a four-wheel drive truck, in the interest of public safety and in view of the constantly changing effective tire diameters (pneumatic tires), the constantly shifting load, and the changing road conditions. Cyclometers connected to the four wheels of a four-wheel driven truck when driven over a distance of 25.7 miles gave readings of 12,925, 12,935, 13,122 and 12,980 revolutions respectively. These and other similar tests show that there is always a difference in the number of revolutions per mile of front and rear wheels respectively. On curves, the front wheels rotate faster, owing to their following arcs of longer radii; on the straightaways the rear wheels will rotate faster, if, as is usual, the load on them per tire is greater than that on the front wheels.

Without free-acting differentials the difference in travel would have to be taken care of by wheel slippage, and wheel slippage produces strain on the driving mechanism in addition to extra tire wear.

DeSmet Describes New Science for Designing and Recording Surfaces

EDGARD C. DESMET, body designer of the Hudson Motor Car Company, presented a paper dealing with progress in automobile body design. Mr. DeSmet defined "planography" as the science of surfaces, their designing and recording. It is closely allied to descriptive geometry, which deals with the surfaces of geometric solids such as cylinders, cones and spheres. Planography covers the design, layout, mensuration and recording of all non-geometric surfaces, such as are found on practical objects like automobiles, airplanes, airships, boats, trains, etc.

Mr. DeSmet stated in his paper that the automobile industry was the first to consider the value of good lines and flowing surfaces as a sales factor that would appeal to the esthetic taste of customers. He said, in part:

"The age of streamlining has arrived and we are now turning our full attention to more scientific designing and shaping of the exterior surfaces of all moving objects. Today the model of next year is selected by the chief executive after many preliminary sessions and a progressive system of elimination and refinement from various full-sized models built up by the designing staff.

"The next step is the reproduction of this full-sized model, the recording of its contours on the production draft, preliminary to the layout of the interior construction and appointment. The reproduction and recording of the actual shape and surface of this approved model, while being considered obviously as plain copy work by the non-initiated, presents, indeed, an infinite number of intricate problems to the man entrusted with the job. Indeed, his orders are to copy and reproduce religiously, but his better knowledge and experience prohibits a policy of exact duplication for reasons most familiar to himself.

"The model being made up by hand, shaped and reshaped many times over, was very likely never touched by the hands of any of the designers themselves. It was built up originally from a very sketchy experimental draft, and has undergone innumerable changes and alterations before attaining the final approval stage. During this entire period of transition, the designers have conveyed their ideas and suggestions by word of mouth or by gesture to the many modelers, or, rather, to the sculptors, who have evidently tried to follow these instructions to the best of their ability, but have nevertheless injected, unconsciously, their own interpretation of the designer's conception.

"The result is a model which, although being entirely satisfactory for general display and appraisal, cannot be adopted for actual large-quantity duplication without undergoing an extensive refinement of lines and surfaces. This refining, or "ironing-out" process, constitutes the surface layout work or "development" of the job, as it has always been called by the trade, and is the phase of body engineering in which we are most interested now."

Mr. DeSmet followed this with a detailed description of the processes followed in making a reproduction of the initial model. He pointed out that the actual lines which should be taken off the model by templates or otherwise, are indeed very small in number. They should be confined to those few major or master outlines and sections which were in reality the only original foundations of the design, bearing in mind that the surface itself is only a medium of transition, of blending from one of these main lines into the other, and that such surface can and should be worked out more scientifically than by the glance of the eye and the feel of the hand of the modeler.

The author went into the matter of selection of the master lines of the model and where and how to make the templates for the purposes of reproduction. The paper was illustrated with a large number of drawings.

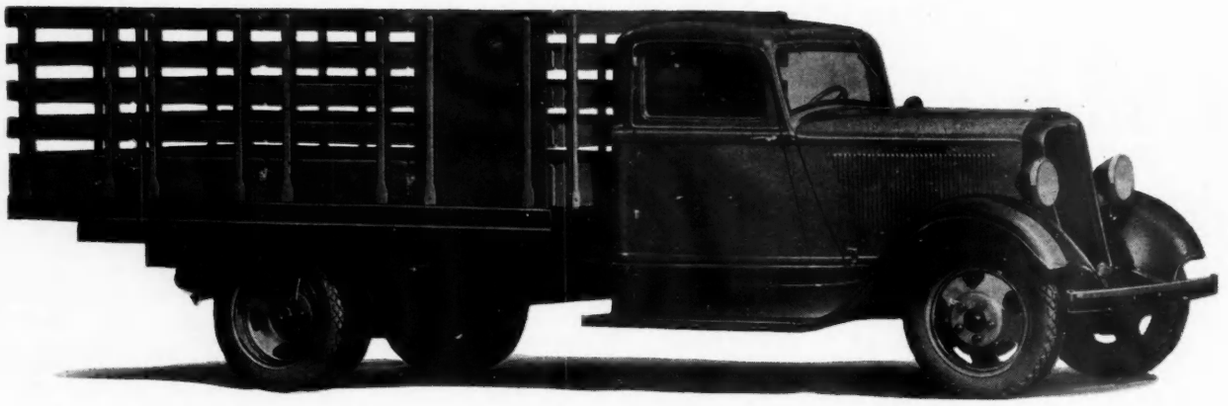
Experiments with Airplane Cowls Show More Speed and Less Drag

EXPERIMENTS conducted to reduce the drag and improve the engine cooling of planes fitted with N.A.C.A. cowling, were discussed in an S.A.E. Annual Meeting paper by R. B. Beisel, Chance Vought Aircraft Corp., and A. L. MacClain, Pratt and Whitney Aircraft Co. Mr. Beisel said that the installation of the cowling on the plane used in the experiments reduced speed 11 m.p.h. and increased temperatures at the heats and bases of the radial cylinders by 62 and 52 deg. respectively. Following the introductions of baffling between the cylinders to direct the air, higher speeds were attained with a reduction of 68 deg. in the head temperature and of 22 deg. in the base temperature. Further experiments resulted in the development of a controllable flap for the cowling which reduced the drag.

The Oxweld Pantosec Introduced

The Linde Air Products Company, New York, N. Y., has introduced a new stationary cutting machine known as the Pantosec. Being a precision shape-cutting instrument, it is especially suitable for cutting dies, cams, and other parts that must be smoothly and accurately cut. With a cutting range of 44-in. longitudinally and 20-in. laterally, it does straight-line cutting, angle cutting, beveling, circle-cutting and intricate shape-cutting. It requires a floor space of 72 x 83 in.

The Pantosec can be operated with a minimum of attention from either the templet end or the blowpipe end, as a hand-guided or as a machine-guided instrument. Angles can be cut without templets, since the cutting head can be locked for travel in any direction. Bevel-cutting is simplified; the provisions for adjusting the machine to the work make it possible to line up the blowpipe without shifting the works; and the dividing head enables the operator to set stops on work that is to be cut in several directions.



New Dodge K-34 1½ ton stake on 161 in. wheelbase chassis

New Line Broadens Dodge Coverage of Truck Market

FOLLOWING a complete reorganization of its truck plant, involving considerable retooling, Dodge Brothers Corporation announces that its truck department is now completely segregated from its passenger-car department. The 1934 truck program includes an additional, heavier-duty, 1½-ton line, while other models are being offered in additional wheelbases.

In the commercial or half-ton line, the major changes are in the front axle and engine. The former is now of the I-beam type instead of tubular as formerly. Engine specifications now show that both the 111-in. and 119-in. commercial chassis (Models KC and KCL) are equipped with 3⅛ by 4⅜ in. engines, as used in the larger model last year.

The compression ratio has been increased to 5.8 to one, raising the horsepower output to 75 at 3600, and the maximum torque to 136 lb.ft. The gear ratio has been reduced to 4.1 to one, to permit higher operating speeds with the increased power.

The 1½ to 2 ton line for 1934 is composed of five models. Two of these, the K30 and K31, are similar to the H30 and H31 models for 1933, except that they have larger engines of increased output. The bore has been increased ⅛ in., the piston displacement is now 217.8 cu. in., and the horsepower rating 78 at 3600, with a torque peak of 150 lb.-ft.

Cylinder blocks are now cast of alloy iron (with nickel, chromium and molybdenum contents), for long life of cylinder walls. The pistons are of the invar-strut aluminum-alloy type.

The other three models in the 1½ to 2 ton line are really intermediate between the K30 and K31 and the 2 to 3 ton series. They are distinguished particularly by the use of a heavier axle and frame, for increased load carrying capacity. They carry the same larger engine as the other 1½-ton models.

In the new K32, K33, and K34 models, which have wheelbases of 136, 148 and 161 in. respectively (compared with 131 and 157 for the K30 and K31) the standard gear ratio is 5.6 to one. Optional ratios range from 5.1 to 7.0 to one. In other respects the models are similar to the K30 and K31.

In the 2/3 ton line there are also three new models, the K45 on a 140 in. wheelbase, the K46 with a wheelbase of 157 in., and the K47 on a 169 in. chassis. These models range in capacity between the above 1½-ton line and the F40 heavy-duty 2-ton series, which is continued.

As compared with the 1½-ton models, the engine is materially larger having a bore and stroke of 3⅜ by 4½ in. Its output is 80 hp. at 3000 r.p.m. With a compression ratio of 5.4 to one, this 241.5 cu. in. engine shows a peak torque of 170 lb.-ft.

Crankshafts are larger in diameter and have almost double the bearing length of the 1½-ton engines. Pistons are of aluminum alloy and of the T-slot type.

These models are provided with five-speed transmissions and have auxiliary rear springs in addition to the regular semi-elliptics. Wheels are steel-spoke type, with 7.00/20 in. balloons standard on the front and dual tires of the same type standard at the rear. Frames are materially heavier than those of the standard 1½-ton line, corresponding closely to the frames of the heavier-duty 1½-ton models.

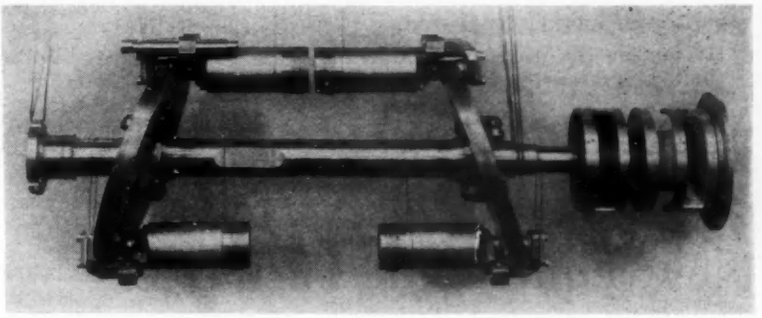
Rear axles are much sturdier than in the standard 1½-ton line all dimensions having been increased, particularly those of the differential housing, gears and bearings. The standard axle ratio for the new 2-ton models is 6.3 to one, with 5.6 and 6.8 to one ratios available optionally.

All these new models in the Dodge truck line regularly carry a new oil-wetted type of air cleaner, formerly supplied at extra cost.

Diesel Engine and Compressor in One Unit

In a new line of "unibloc" Diesel and gas engine air compressors put out by the Worthington Pump and Machinery Corporation, a compressor cylinder is mounted directly on top of a standard vertical four-cycle Diesel or gas engine. The piston of one power cylinder is replaced by a crosshead, connected by a piston rod to the piston of the compressor cylinder located directly above it. The chief advantage of this construction—aside from manufacturing advantages—is that it gives a very compact unit.

Sterling Will Produce Line of High Speed, Swash-Plate Marine Diesels



Principal moving parts of crankless Diesel engine, including main shaft, swashplates, pistons, bridges and guides, and rotary valve of scavenging pump.

A LINE of high-speed Diesel engines incorporating the swashplate mechanism of the Australian inventor, A. G. M. Michell, whose thrust bearing is widely used in marine practice, has been developed by the Sterling Engine Co. of Buffalo. The new line, as reported in our issue of Jan. 27, was displayed at the recent Motor Boat Show.

The engine is to be manufactured in four different sizes, of the following ratings (the first rating in each case being the maximum output for continuous and the second for intermittent service).

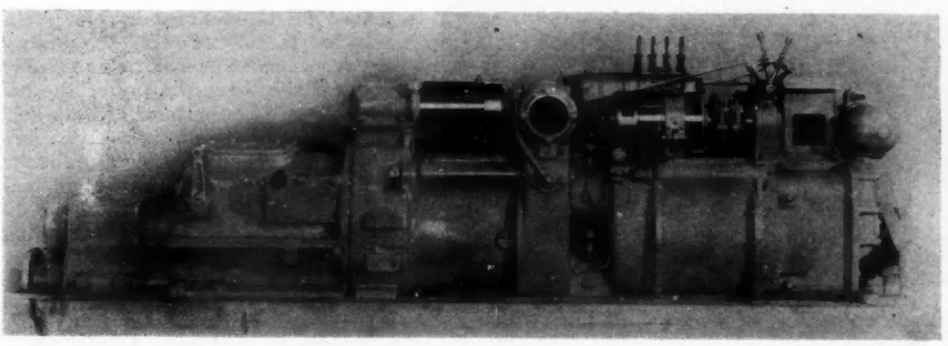
Model	HP. Rating	Speed
CD-435	125-140	1800
CD-45	300-350	1500
CD-46	500-550	1500
CD-47	625-675	1200

The engine operates on the two-stroke principle and is built in four-cylinder form with two opposed pistons in each cylinder, between which the gases are compressed and expanded. As may be seen from the accompanying illustration of the moving parts, each piston works directly on a swashplate, without the intermediary of a connecting rod, hence there are no secondary harmonics of inertia forces and the balancing problem is simplified.

Gaseous flow through the cylinders is always in one direction, since one of the pistons in each cylinder controls the exhaust ports and the other the inlet, or rather the transfer ports, so that the charge enters the cylinder at one end and the gases of combustion escape at the other. In order to make it possible to open the exhaust ahead of the intake and at the same time close it earlier than the intake, the swashplate operated by the pistons which control the exhaust ports is set in advance of the other one. The pistons act on the swashplate through the intermediary of slipper-type bearing elements, as shown in the illustration. The bridges of the free ends of the pistons move on guide bars so there is no side thrust on the cylinder walls.

With a two-stroke engine it is, of course, necessary to employ a scavenging pump in which air for scavenging and charging the cylinders can be compressed. Most two-cycle Diesel engines use rotary air pumps or scavenging pumps, but in the Sterling engine reciprocating pumps are used, whose cylinders are coaxial with the working cylinders and whose pistons are driven from the working pistons by being direct-connected to one set of the working pistons through the intermediary of piston rods and bridges which span the edge of the swashplate. Admission of air to the cylindrs of the scavenging pump is controlled by means of a rotary valve on the main shaft. Air is compressed to between 6 and 8 lb. per sq. in. above atmosphere.

Among the advantages claimed for this engine is that there are no cylinder heads and therefore no cylinder head gaskets, which are often a cause of trouble in an engine



Sterling marine-type crankless Diesel engine

where the cylinder pressures are as high as in a Diesel. The structure of the engine, moreover, is not subjected to the gaseous pressure in the combustion chamber, as this pressure is taken up on the two swashplates and the shaft on which they are mounted. Since there are no water-cooled cylinder heads, there is less loss of heat from the compressed gases, and less difficulty therefore is experienced in starting an engine from cold.

Air enters the working cylinders through inclined ports, whereby its motion in the working cylinders is controlled and combustion conditions are improved. The main shaft is supported in three widely-spaced bearings.

Owing to the fact that the swashplates possess considerable inertia and that the aggregate inertia force of the pistons is constant for constant speed, no flywheel is required, which, of course, tends to lighten the engine. The only gearing required is that for driving the accessories, viz., fuel, oil and water pump, and a generator. It will be noticed from the illustration of the engine that both the air and exhaust connections are accessibly located on top of the engine, where all accessories are also mounted.

The engines shown at the Boat Show were of the Model CD-435, which has a bore of 3½ in. and a stroke of two times 5 in., making the displacement 385 cp. in. This figures out to a b.m.e.p. of 71.5 lb. per sq. in. for the continuous-service rating and 80 lb. per sq. in. for the intermittent-service rating.

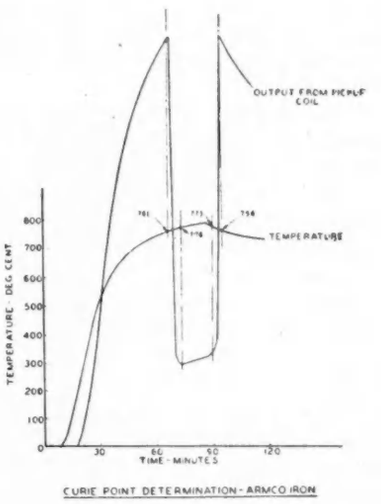
New Equipment Facilitates Measurement of Curie Point

ELEMENTS or alloys which are magnetic at normal temperatures become non-magnetic if their temperatures are raised above a certain critical point known as the curie point. The magnetic properties are regained in most materials upon cooling, although the point on cooling is not at the same temperature as upon heating. To determine this curie point with the minimum of attention on the part of an operator, an apparatus has been designed and built at the Westinghouse Research Laboratories.

The apparatus is comprised of a furnace to heat the specimen under test, a magnetic transmission system of which the specimen is a part, and a recording apparatus. The transmission system shown in Fig. 1 is composed of two cobalt bars with the sample placed between their two ends. At the left is a coil which sends energy through the bar system to the pick-up coil on the right. A thermocouple is attached to the specimen to show its temperature. The energy received by the pick-up coil and the temperature indication for the thermocouple are recorded on a chart by a recorder.

In operation, inasmuch as the ability of the specimen to transmit magnetic energy decreases enormously after passing the curie point, and as the energy received by the pick-up coil passes through the specimen, the energy received by the pick-up coil is an indication of what is happening in the magnetic transmission system; hence, from the record of temperature and energy received by the pick-up oil, the curie point of the sample can be determined.

A record as drawn by the apparatus is shown in Fig. 2. This shows a curve made on Armco iron, the specimen being one-half inch diameter by one inch long. As shown on the sketch, the point on heating ranges between 761° C. and 776° C. and on cooling from 773° to 756° C. This corresponds to the accepted value of 768° C. for pure iron.



CURIE POINT DETERMINATION - ARMCO IRON

Fig. 2—A record made with a piece of Armco iron as a specimen. The points of intersection are the points of magnetic change

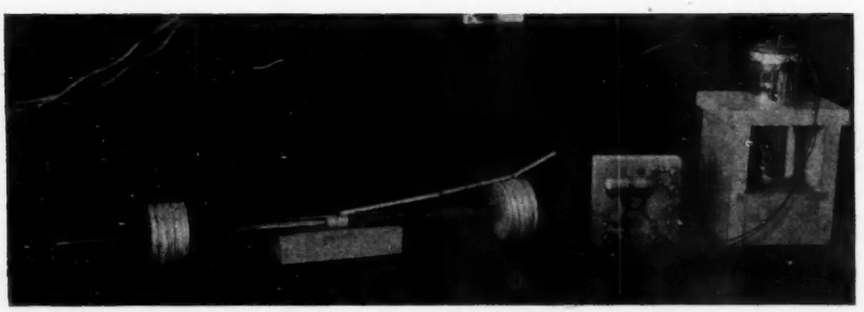


Fig. 1—The transmission system composed of two cobalt bars with the sample

Fuel Mileage Tester

Zenith-Detroit Corporation has placed on the market a commercial-vehicle model of its fuel-mileage tester. It is suspended by two padded hooks fitting over the top of the cab-door glass. The burette or bulb holds one-fifth of a gallon between calibration marks, instead of 1/10 gallon as in the passenger-car model. In making use of the instrument, the difference in the speedometer readings between the start and the finish of the test (during which time one-fifth of a gallon of fuel is consumed) is multiplied by five to obtain the miles per gallon.

PRODUCTION LINES

Lets Riddle

Looks the same. Feels the same. But it's different. So ye old skeptic tried the block test. What we're getting at is the Elco Block test for showing the difference between the speedized (chemically surfaced wood screws) and ordinary wood screws. Screw each type into similarly drilled holes and the difference is apparent. Try the block test on your assembly line foremen, than whom there are no better skeptics.

Learned Court

A recent court decision in New York State is quoted in the news as follows: "The plaintiffs' assumption that provisions of the National Recovery act fortify their position is a mistaken one," the Judge said. "Nothing in that act curtails the rights previously enjoyed by labor. Quite to the contrary, Congress has greatly strengthened the arm of labor by stripping its traditional enemy of two highly effective weapons, viz. the company union and the open shop."

Particularly pointed is the remark that the employer evidently is the "traditional enemy" of labor.

From Headquarters

A report by the Chemical and Metallurgical Department of the Ford Motor Car Company, quoted in part below, indicates the variety of applications to which this important manufacturer is applying the alloyed material.

"Nickel chrome iron dies are used for forming such parts as the head lamp shell, radiator shell, ammeter cases, and many other large and small parts, including fenders, body sections, etc. . . . For these uses the cast iron has the following requirements:

1. Uniform hardness.
2. High degree of wear resistance.
3. Ease and uniform machinability.
4. Strong and dense structure.

"For the smaller parts alloy iron dies containing approximately 2.00 per cent nickel and 0.70 per cent chromium are heat treated by oil quenching from 1550 deg. F., reheated to 900 deg. F. and air-cooled to a hardness between 286 and 321 Brinell."

—From *Inco*, Vol. XII, No. 1

Answers Everything

Have you ever attempted to analyze your fire insurance policy? Have you ever been perplexed in regard to the actual coverage it affords? Do you know what is actually insured under the standard policy forms? These are questions which are answered for the layman in a stout little book called "An Approach to Fire Insurance" by Clayton G. Hale, just published by the *Spectator Company* in connection with its Dollar Library.

Bears Watching

One low priced car has a radiator ornament conventionalizing the peacock. And what was our dismay to learn from a fellow commentator who happens to hobnob with stage people, that a peacock is taboo in their profession. Maybe the ornament ought to be off when demonstrating to a stage professional.

Stumped Us

Our attention was drawn to a very doggy sport model which seemed to have no provision for a spare tire, unless the job "as sold" has fender wells. We had no time to check but our attention-caller said he had queried the salesman and found that they didn't know the answer.

E-P Lubes

One who is an expert by right of experience and common sense tells us that you can't make E-P lubes from cheap ingredients or to sell at low price. In this respect E-P lubes differ from volume manufacture of mechanical parts. Perhaps that is why some question has been raised concerning the utility of such lubricants. The expert goes on to say that the right material, which is not inexpensive as such things go, does meet the problem acceptably. It's something well worth noting.

Stream Chatter

Why is it that streamlined jobs still have the spares in fender wells? Or hanging off the beautifully sloped rear panel? Also couldn't much efficiency be gained by making tail lamps and license plates less obtrusive? Such little details stand out to anyone with just a little curiosity.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

Dealer National Control Committee to Confer with Factories on Del'd Prices

Proposition to Revise Code to Cover Trucks of More Than ¾-Ton Capacity Up for Consideration As Is Question of Discounts to Be Allowed Fleet Buyers

CHICAGO, Feb. 1—The Emergency National Committee of the retail automobile trade in session here today formally requested the National Control Committee, the executive group for the dealer code, to negotiate with motor car manufacturers to obtain immediate harmony on delivered prices. Factories have been supplied with an approved list of items to be included in delivered prices and requested to counsel with their own dealers for the purpose of establishing proper amounts on each item for their own make.

It was revealed during the meeting of the Emergency National Committee that NRA Deputy Administrator Ammerman wrote the dealer code authority on Jan. 25 in part as follows: "In general we do not construe section 1 (Article IV, Title B) to include any charges which represent part of the dealer's general cost of doing business or any charges imposed by the manufacturer which in effect may represent a decrease in the discount allowed the dealer by the manufacturer."

This official interpretation is at variance with the ruling on what must and might be included in delivered prices issued by the dealer code authority during the New York Show. (*Automotive Industries*, Jan. 20, page 80.)

The NRA interpretation apparently takes into account the fact that some dealer contracts provide that certain "extras" such as advertising charges shall be absorbed by the dealer and not passed on to the buyer in the delivered price. Where no such contractual condition exists, opinion here is that advertising charges may be passed on to the buyer.

A proposal to revise the code to make it cover trucks of over ¾-ton capacity which are now excluded, is also scheduled for discussion. The plan under consideration, it is reported, would set used truck allowances on the basis of fixed percentages of the original new truck price, the percentage depending on the age of the truck, as the hearse and ambulance code provides. Whether such a change can be made in the code without going through the amendment procedure required by NRA is a question on which opinions here differ.

The question of fleet discounts is also scheduled for discussion. One proposal under consideration is that the code be amended to exclude factories participating in sales to states but to permit dealers to make a 3 per cent allowance on sales to recognized fleet buyers.

At the annual convention of the National Automobile Dealers' Association on Monday and Tuesday of this week a new constitution and by-laws were adopted tending to merge the association and code officers. Provision was made for 56 directors, five of whom are to be used car dealers, which would give a setup for the board corresponding to the Emergency National Committee. An executive committee of 15 members would also be formed.

1934 G. M. T. Line Has Three "Camel-Back" Types

PONTIAC—Three cab-over-engine truck models with a weight distribution of 33 1/3 per cent front and 66 2/3 per cent rear, lead the parade of new heavy-duty trucks offered by G. M. C. for 1934. The line also includes a series with conventional axle position and a group of heavy-duty jobs with set back front axle giving a weight distribution of 30-70.

Cab-over-engine models feature a patented cab air-conditioning system as well as a wind tunnel shroud in the engine compartment whose function is to draw the heated air and gases out under the vehicle.

Struble Named Head of Reo Truck Sales

LANSING—E. G. Poxson, general sales manager Reo Motor Car Company, has announced the appointment of Allen L. Struble as head of the Reo Motor Car Company's truck and Speed Wagon sales division to succeed W. Carl Parker. Mr. Struble has been associated with the sales organization of the Reo company's truck division for the past three years. In 1918 he was connected with the Republic Truck Company of Alma, later with the Transport Truck Company and eventually with the Federal Truck Company, Detroit.

Ford Builds 57,575

DETROIT—Ford production in the United States totalled 57,575 in January, the largest monthly output since June, 1932, and the best for January since 1930. Actual production exceeded original January schedules by 10,791 units. Ford January payrolls in the Detroit area totalled $7,500,000.

NE

Sales and Attendance Gain at Chicago Show

Business on First Two Days Total 354 New Cars Against 272 Last Year

CHICAGO, Feb. 1—With expectations that total car sales would exceed 2200 units and attendance would be between 200,000 and 210,000, Chicago's National Automobile Show experienced its best day yesterday (Wednesday) with 30,000 visitors, an increase of 11 per cent over the same day last year.

Yesterday's crowds offset a great part of the losses sustained Monday and Tuesday due to cold weather.

Car sales up until Thursday morning were reported as 1422, a gain over last year.

Show officials estimated an average increase in attendance at 20 per cent, but increased interest as the show went into its last three days gave rise to predictions of even larger increases.

The Chicago Automobile Trade Association figures on sales for Saturday and Sunday (day and a half) showed 354 cars sold, against 272 for the same period last year. Monday's sales, running counter to the attendance, were 263 cars, against 240 a year ago.

Show officials reported unusual interest in the animated displays and a growing interest in the mechanical features offered this year. "Knee action" and the other independently sprung models were the center of interested groups and the new streamlined models brought generous public response. DeSoto's marionette show and the turntable displays were crowded at every session and the Plymouth robot kept long lines waiting to use the headphones.

Attendance at the National Automobile Dealers' Association convention, which opened Tuesday in the La Salle Hotel, was the largest on record for a Chicago meeting. More than 3000 dealers were registered.

The association's annual banquet

(*Turn to page 150, please*)

WS

SAE Summer Meeting to Be Held at Saranac Inn

NEW YORK—The 1934 Summer Meeting of the S.A.E. will be held at Saranac Inn on Saranac Lake in the Adirondack Mountains, New York. The exact dates have not been set, but it is expected that the meeting will take place early in June. The last time the society met at Saranac was in the summer of 1929.

Corrigan-McKinney Rumor Denied by General Motors

DETROIT, Jan. 30.—General Motors Corp. denies that it intends to acquire the Corrigan-McKinney Steel Co., Cleveland, and its subsidiary, the Newton Steel Co., Monroe, Mich., as rumored. Newspaper stories the past few days have credited General Motors with conducting negotiations toward an agreement whereby it would place half its steel requirements for the next two years with Corrigan-McKinney and Newton in the products made by those two companies and at the end of that time have the privilege of purchasing them.

It is no secret that General Motors has been dissatisfied with provisions of the steel code, especially with the one-price policy whereby large steel users no longer are granted lower prices than small consumers. It likewise is understood to be opposed to increases in second quarter prices of sheets and strip steel, which are being considered by the steel industry. It feels that the automobile industry, in large measure, constitutes the sales department of steel companies, inasmuch as it fabricates and puts into the hands of the public the steel which mills produce. In this position of selling steel to the ultimate consumer and thereby increasing the demand for steel, it believes that it is entitled to preferential treatment.

Production Expands Fast As January Ends Bringing Month's Total Close to 150,000

Ford Now Building 3,800 Daily and Is Headed for 5,000 Daily Mark—Chevrolet Schedules 80,000 for February and Plymouth 42,000—Employment Booms

by Burnham Finney

DETROIT—Motor car production expanded so rapidly the past week that assemblies totaling approximately 150,000 units seem assured for the month of January. The three leading manufacturers—Ford, Chevrolet and Plymouth—were mainly responsible for the pronounced upswing.

Ford's operations have surged upward with surprising speed, late last week passing the 3800-a-day mark. This week, output at the Rouge plant is expected to rise further to 4000 units a day, five days a week. In January, Ford is reported to have fallen only slightly short of 60,000 units, with its February goal set at 75,000.

In fact, Ford is experiencing difficulty at present in keeping production abreast of sales. Its objective is understood to be the boosting of manufacture to 5000 cars a day. Since its plant was originally tooled up for only a limited volume of the current V-eight models, the remainder of the production capacity to be devoted to the proposed small V-eight, considerable change-over in equipment has been effected recently so that all of the facilities can be devoted to the present car.

Having overcome its major troubles in making its front-end units, Chevrolet production is rising at a greatly accelerated pace as compared with previous weeks this year. Assemblies have gone above 2000 units a day. Output in February will be limited only by the ability to produce cars. The tentative schedule is said to be 80,000 units, of which 25,000 will be trucks, but passenger car assemblies will be pushed as far as possible above 60,000.

Plymouth has doubled its daily rate and now is at 1200 cars. It expects to get up to 1800 to 2000 a day within a short time. It hopes to turn out 42,000 units in February. Dodge is expanding rapidly, digging into a backlog of over 32,000 orders from dealers. Of that number over 5000 are for commercial cars and trucks.

The first Airflow De Soto came off the line last week, and it is expected that assemblies will increase slowly during the coming month. Total output of the Chrysler Corpn. in February should be 50,000 to 60,000 cars.

Increased automotive operations have proved a boon to employment in southern Michigan. With production expanding so rapidly, Detroit is facing a shortage of skilled help, particularly among so-called body tradesmen. This includes metal polishers, metal finishers and welders. There likewise is a threatened shortage of certain kinds of skilled machine operators.

Buick turned out about 9700 cars in January, and has approximately the same number scheduled for February.

It is estimated that unless production fails to expand as rapidly as now seems assured, February assemblies for industry will reach at least 225,000 units.

Pontiac, which is reliably reported to have made 7000 cars in January, is planning to double that figure in February with a 50 per cent increase over February tentatively set for March.

$500,000 May Settle Overland Disputes

TOLEDO—Payment of $500,000 to bondholders of the Willys-Overland Co., to be derived from sale of excess machinery and equipment not required by receivers for operation of the plant, is provided in settlement of the disputes between bondholders and general creditors laid before a Federal court here tonight.

Order to all parties having claims to show cause why manufacturing program of 5000 to 7500 cars should not go forward will be issued by the court providing for written objections to be filed before 9:30 a. m. Feb. 7 and hearing is scheduled for 1:30 p. m. same day.

Miller Building Racers

INDIANAPOLIS—Harry Miller is reported to be working here on a race car or two for the 500-mile race on Memorial Day.

Olds Aims at 100,000 Mark

LANSING—Oldsmobile is aiming at a production of 100,000 units this year, as contrasted with 38,000 in 1933, according to a statement made by C. L. McCuen, president and general manager, at a dinner for Olds officials staged by the local chamber of commerce.

Dodge Truck Shipments

DETROIT—J. D. Burke, director of truck sales of Dodge Brothers Corp., reports that domestic shipments of Dodge trucks during the year 1933 amounted to 33,262 units.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Improvement Spotty

There was a further improvement in general business last week, but the betterment was not evenly distributed throughout all sections of the country. Both wholesale and retail business increased, with many stores reporting the volume of business during January as the largest in four years.

Prices Higher

The Guaranty Trust Company's index of business activity for December stood at 63.3, as against 64.1 for the preceding month and 58.7 a year ago. The Company's index of wholesale commodity prices on Jan. 15 was 51.9, as against 49.8 a month earlier and 33.5 a year earlier.

Car Loadings Gain

Railway freight loadings during the week ended Jan. 20 amounted to 560,430 cars, which marks an increase of 4803 cars above those during the preceding week, an increase of 60,876 cars above those a year ago, and a decrease of 1671 cars below those two years ago.

Cotton Spinning

There were 30,938,340 cotton spinning spindles in place at the end of December, of which 24,840,870 were operated at some time during the month, as against 25,423,348 operated during November and 23,799,742 a year ago.

Employment Lower

According to the Department of Labor, factory employment in the United States during December declined 1.8 per cent, as compared with that in the preceding month. However, the December level was 20.2 per cent above that in the corresponding period last year.

Power Up 9.5%

Production of electricity by the electric light and power industry in the United States during the week ended Jan. 20 was 9.5 per cent above that in the corresponding period last year.

Oil Output Declines

Average daily crude oil production for the week ended Jan. 20 amounted to 2,294,600 barrels, as against 2,311,250 barrels for the preceding week and 2,015,300 barrels a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended Jan. 27 stood at 72.5, as against 72.1 the week before and 72.0 two weeks before. The current figure is the highest since May 4, 1931.

Federal Reserve Credit

The consolidated statement of the Federal Reserve banks for the week ended Jan. 24 showed decreases of $4,000,000 in holdings of discounted bills and of $8,000,000 in holdings of bills bought in the open market. Holdings of Government securities remained unchanged.

McQuay-Norris Adds Two To Board of Directors

ST. LOUIS—The board of directors of the McQuay-Norris Mfg. Company was increased from seven to nine members at the annual stockholders' meeting held Jan. 22. The following directors were elected: W. K. Norris, A. G. Drefs, A. J. Mummert, H. W. Knapp, C. R. Kalb, all of St. Louis; W. C. Winter of Chicago, L. T. Cummings and H. A. Wainwright of Connersville, Ind., and R. F. Crom of Indianapolis.

W. K. Norris was reelected president of the company and A. G. Drefs was reelected vice-president and treasurer. A. J. Mummert, formerly secretary, was made vice-president, and H. W. Knapp was elected secretary. C. C. Auten was appointed assistant secretary and C. C. Tapscott was named advertising manager.

Italy Ups Tariffs

WASHINGTON—An Italian decree, published and effective on Jan. 23, 1934, substantially increased the import duties on automobiles, trucks, automotive bodies, motors and parts, according to a cablegram to the Department of Commerce from Commercial Attache Charles A. Livengood, Rome.

The new rates of duty on passenger cars and trucks are approximately three-fifths higher than the former rates, and on automobile bodies, motors and parts almost double the former rates. The general rate of duty on tractors was also increased by about three-fifths, but it is understood that the lower conventional rate remains in effect for the present by virtue of an existing tariff treaty.

1933 Car Sales Show 22.4% Gain in Value

December Drop Ends Seven Months of Gains over '32

Preliminary estimates of the value of retail sales of new passenger automobiles, computed from the number of cars sold as reported by the National Automobile Chamber of Commerce, show a decrease of 10 per cent for the past December over December, 1932, and a decrease of 49 per cent as compared with December, 1931, according to Willard L. Thorp, director, Bureau of Foreign and Domestic Commerce. There was a decrease of 47 per cent from November.

This is the first time in four years that sales in December have dropped below the sales of the previous month and is a considerably greater drop than the 27 per cent registered in 1929, the last time such a decrease occurred. This may be accounted for to a large extent by the fact that practically all of the manufacturers released their new models during January of this year instead of from one to three months earlier, as has been the practice for the past several years.

Figures for the year 1933 were 22.4 per cent greater than in 1932, which had been 43.7 per cent below those of 1931. The volume of sales for the first four months of 1933 was considerably below the same months of 1932, but from May to the end of the year each month except December showed an increase over the same month of the previous year.

Ames Becomes Aide To Auburn President

CHICAGO—H. T. Ames, president of Duesenberg, Inc., has been appointed assistant to the president of Auburn. Mr. Ames will assume his duties at once and will be located in the general headquarters of the company at Auburn, Ind. According to the announcement by Auburn president Beal, Mr. Ames will concentrate on sales in the Auburn organization, but will continue as president of Duesenberg, Inc.

Annual Meeting Draws New Record Attendance

Hill Stars as Toastmaster at Banquet Finale Staged by SAE's Detroit Section

DETROIT—A banquet staged by the Detroit Section, which Toastmaster L. Clayton Hill called the "Airflow Session," closed the Annual Meeting of the SAE on Thursday of last week. Total attendance at both the banquet and the Annual Meeting set new records.

Paul W. Litchfield, president of the Goodyear Tire and Rubber Co., was the featured speaker at the dinner, with Toastmaster Hill providing introductions that were greeted with gales of laughter. Among the honor guests at the speakers' table were Walter P. Chrysler, W. S. Knudsen, O. E. Hunt, Fred Zeder, C. F. Kettering, Harry Woolson, Jesse Vincent, Dr. H. C. Dickinson, "Bill" Stout, A. J. Scaife and John A. C. Warner.

The Manly Memorial Medal, awarded annually for the best paper during the year on aircraft engines, was presented to A. J. Fedden, who received it for his father, A. H. Roy Fedden, Bristol Aeroplane Co., Ltd., England. In a short speech of acceptance, Mr. Fedden, Jr., expressed his father's appreciation and his own pride in his father in a manner that convinced those present that the son was also one of whom the father might well be proud.

E. N. Jacobs of the N.A.C.A. also was presented with the Wright Brothers Medal at the dinner. This medal is awarded for the best paper presented on aerodynamic subjects. Both presentations were made by Robert Insley, vice-president of the aircraft engine activities, and were awarded for papers presented at the International Congress held in Chicago in September.

Short talks were made by President-elect Roos and by General Manager Warner. The evening wound up with Frank Carlton Nelson, described as an "Indiana Poet."

Ford Increases Parts Discounts

DETROIT—Parts discounts granted by Ford dealers to established independent and fleet repairshops have been increased from 25 to 30 per cent. Any repairshop recognized as eligible by the local dealer code authority may obtain the discount, it is understood.

The Ford Motor Co. is also understood to have increased discounts granted its dealers on parts. The base discount is now reported to be 42 per cent with "key" dealers getting 49 per cent. The new discounts are said not to apply to accessories, exchange deals and to some body parts.

Wage Earner's Buying Power Increased 10 Per Cent in '33

December Employment, Hours and Earnings Are Close to November

NEW YORK—Employment, hours, and earnings in manufacturing industry for December showed only slight changes from their November levels, according to the National Industrial Conference Board's monthly report on employment conditions released today. Such changes as took place amounted in each case to less than 1 per cent. Employment, average hourly earnings, and average weekly earnings increased by fractions of 1 per cent, while average hours worked per week remained stationary. In comparison with preceding months, employment conditions in December showed marked stability.

The average industrial wage-earner in December, the Conference Board finds, worked 34 hours per week, earned 54.8 cents per hour, and received $18.58 in his weekly pay envelope. In the same month one year ago, weekly work time averaged 35.4 hours, at 46.7 cents per hour, yielding weekly earnings of $16.37. The buying power of the wage-earner's income increased during the year 10 per cent, owing to the fact that weekly earnings rose 13.5 per cent, while the cost of living advanced only 2.9 per cent.

Exports and Imports for the Automotive Industry for December and Twelve Months Ended December, 1933-32

	December				Twelve Months Ended December			
	1933		1932		1933		1932	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	....	$9,306,811	....	$5,117,758	....	$90,631,378	....	$76,273,755
Motor trucks, buses and chassis (total)	6,460	2,897,143	2,221	1,049,352	43,616	20,112,818	24,960	11,712,533
Under one ton	578	164,844	165	45,741	4,779	1,401,346	2,226	604,115
One and up to 1½ tons	4,985	1,867,007	1,765	690,455	32,325	12,386,326	19,745	7,926,524
Over 1½ tons to 2½ tons	727	580,730	218	197,792	4,941	4,027,792	2,086	1,743,197
Over 2½ tons	153	276,650	63	110,114	1,306	2,157,339	758	1,301,785
PASSENGER CARS								
Passenger cars and chassis	3,066	1,801,573	2,757	1,355,430	64,511	32,100,012	41,441	23,609,420
Low price range $850 inclusive	2,660	1,378,275	2,520	1,089,961	59,694	26,734,171	35,534	16,978,715
Medium price range over $850 to $1,200	213	203,839	134	135,003	2,640	2,543,486	3,299	3,142,976
$1,200 to $2,000	66	104,264	48	66,244	1,087	1,660,844	1,239	1,638,381
Over $2,000	30	75,492	10	40,835	333	866,736	586	1,544,460
PARTS, etc.								
Parts except engines and tires	....	2,161,998	....	1,300,794	....	18,348,113	....	21,047,765
Automobile unit assemblies	....	1,836,249	....	966,556	....	13,672,763	....	12,943,379
Automobile parts for replacement (n.e.s.)	....	199,044	....	114,882	....	1,576,567	....	1,466,949
Automobile accessories (n.e.s.)	....	119,591	....	67,232	....	1,050,705	....	1,450,691
Automobile service appliances	....	210,424	39	835,740	406	5,391,493	280	4,358,967
Airplanes, seaplanes and other aircraft	29	135,023	....	259,159	....	2,249,172	....	1,756,421
Parts of airplanes, except engines and tires	....							
INTERNAL COMBUSTION ENGINES								
Stationary and Portable:								
Diesel and semi-Diesel	8	28,593	5	32,572	45	162,138	51	220,884
Other stationary and portable								
Not over 10 hp	796	32,486	125	8,404	3,712	218,171	3,821	245,787
Over 10 hp	82	87,149	55	23,197	780	378,569	711	344,223
Automobile engines for:								
Motor trucks and buses	266	32,734	40	11,446	2,180	289,949	1,664	288,672
Passenger cars	650	34,711	722	66,990	19,397	1,173,346	20,663	1,583,616
Aircraft	270	230,824	53	414,563	2,903	1,452,341	2,356	1,517,682
Accessories and parts (carburetors)	....	85,853	....	70,664	....	961,273	....	1,177,877
IMPORTS								
Automobile and chassis (dutiable)	41	23,296	46	18,002	533	297,873	540	251,206
Other vehicles and parts for them (dutiable)	....	6,592	....	4,225	....	114,962	....	66,467

General Motors Earns $83,214,000 in 1933

Fourth Quarter Profit Cut to $1,804,000 by Model Change Delays

NEW YORK—Subject to possible further adjustments upon final closing of the books, preliminary net earnings of General Motors Corporation for the year ended Dec. 31, 1933, including equities in the undivided profits or the losses of subsidiary and affiliated companies not consolidated, amounted to $83,214,000, contrasting with $164,979 in 1932.

Earnings in 1933, after preferred dividends, amounted to $1.72 per share on the common stock. These earnings are after providing for depreciation of real estate, plants, and equipment, amounting to approximately $30,100,000 in 1933, and after making provision of $5,000,000 for possible losses on impounded cash balances in closed banks. Indicated fourth-quarter earnings were $1,804,000, against a deficit of $10,390,196 in the last quarter of 1932.

The preliminary figure for cash, United States Government and other marketable securities at Dec. 31, 1933, amounted to $177,000,000, compared with $172,780,695 at Dec. 31, 1932. Preliminary net working capital at Dec. 31, 1933, amounted to $244,000,000, compared with $225,437,194 at Dec. 31, 1932. These figures as of Dec. 31, 1933 exclude both impounded cash balances in closed banks and the investment in capital stock of the National Bank of Detroit.

"Operations for the last quarter of 1933," President Sloan said, "were affected by unavoidable delays in getting into production of the corporation's 1934 model automobiles. Referring to operations for the fourth quarter of 1933, normally it requires approximately 65,000 cars and trucks in order to provide distributor and dealer outlets at home and abroad with adequate sample stocks of new models. This year, due to the unavoidable delays in production, this amount was seriously curtailed; in fact, only 21,600 new model cars were manufactured during the fourth quarter. The result was increased overhead and lost profit, which had a material effect on earnings for the fourth quarter. This does not necessarily mean a loss of business, but the transfer of a certain amount of business from the fourth quarter of 1933 to the first quarter of 1934.

"During 1933, General Motors dealers in the United States delivered to consumers 755,778 cars and trucks, compared with 510,060 in 1932, an increase of 48 per cent. Sales by General Motors Operating Divisions to dealers in the United States during 1933 amounted to 729,201 cars and trucks, compared with 472,859 in 1932, or an increase of 54 per cent. Total sales to dealers, including Canadian sales and overseas shipments, amounted to 869,035 cars and trucks in 1933, or an increase of 54 per cent over the total of 562,970 reported in 1932."

Swan Wins $621,560 Verdict Against G.M.

TOLEDO — Largest verdict ever rendered by a jury in the northern district of Ohio was returned in Federal Court here for $621,560.24 against the General Motors Corp. and in favor of the Swan Carburetor Co., Cleveland.

The judgment was for royalties alleged to be due on patents on a manifold and carburetor used by the General Motors.

It was the nineteenth victory for the Swan interests in seven years of litigation over patent rights. This judgment brings awards to nearly $750,000. Six years ago the Swan company won $116,000 from General Motors in a similar suit. It was claimed that General Motors had a contract for the use of the invention, but later changed its manifolds slightly to avoid the royalty payments. Infringement was claimed by Swan and the royalties assessed by the jury verdict. The Toledo verdict was for royalties up to March 31, 1930, and officials of the company said they also expected to collect royalties since that date.

Aeronautical Chamber Reelects T. A. Morgan

NEW YORK — The Aeronautical Chamber of Commerce of America, Inc., held its annual meeting here on Jan. 25. Thomas A. Morgan, president of Curtiss-Wright Corporation, New York, was reelected president of the Aeronautical Chamber. Leighton W. Rogers was reelected executive vice-president in charge of the active management of the trade body. Other officers include, vice-presidents, Donald W. Douglas, president of the Douglas Aircraft Co., Santa Monica, Calif.; R. H. Fleet, president of the Consolidated Aircraft Corp., Buffalo, N. Y.; Alfred Frank, president of National Parks Airways, Salt Lake City, Utah; secretary, G. M. Bellanca, president of Bellanca Aircraft Corp., New Castle, Del.; treasurer, Charles L. Lawrance, president of the Lawrance Engineering & Research Corp., New York; assistant secretary, Fowler W. Barker; and assistant treasurer, Frank J. Walsh.

Dodge Sells 1750 1933 Models in Week

DETROIT—Dodge dealers report sales of 1750 1933 models during the week ending Jan. 13. Of these sales, 1266 were passenger cars and 484 trucks. During the same week, used car sales totaled 3442 units.

N. Y. Code Authority Attacks Delivered Price Plan as Attempt to Pass Price Increases on to Dealer

NEW YORK—"The Detroit scheme for eliminating F.O.B. prices" and substituting a system of quoting delivered prices only on automobiles was approved in principle and attacked in detail as a violation of the Motor Vehicle Retailing Code in a statement issued Jan. 28 by John B. Hulett, Administrator for the New York area.

Mr. Hulett hailed the scheme as a much needed reform, calculated to remove the confusion in price quotation which has been a long standing evil of the automobile business. Continuing, he said:

"The customer, attracted by the F.O.B. price, is always disillusioned to the tune of about a hundred dollars or more, when he finally decides to buy. The legitimate freight and handling charges are billed separately in automobile sales, whereas in the case of other commodities, these charges are an integral part of the quoted price, a practice which elicits no protest from the buyer. I am prepared to issue a ruling making a system of one price quotation mandatory upon dealers in this area, provided the manufacturers meet my objections by including in such prices the dealers' costs as specified in the Code."

Mr. Hulett attacked the scheme, as put forth by Detroit, as a direct violation of the Motor Vehicle Retailing Code. Under this scheme, the handling charges are reduced to a point where dealer profit is so small that it will mean ruin to hundreds of small dealers, he said.

"The Detroit scheme, meritorious in principle, is in its arithmetic, an attempt to pass on to the dealer the rise in the list prices of automobiles," he added. "This rise in prices is justified because the manufacturer has been put to added expense as a result of the N.R.A. On the other hand, the dealer also has increased his cost of operation for the same reason. This scheme, cutting the handling charges by about 80 per cent is not only unfair but ignores the article of the Retailing Code which definitely lists the charges that must be added to the F.O.B. price of the car."

"The Code is explicit. It states that 'no dealer shall sell a new car at retail to a consumer at less than the factory list price plus an amount equal to the freight, taxes, equipment, etc.' Every item is listed. There is no room for misunderstanding.

"Any attempt to eliminate these charges from the price of an automobile is a violation of the Code."

Production and Payrolls Boom in Toledo Plants

TOLEDO—Employment in 51 plants here, mostly automotive, has increased by 541 workers in the last two weeks.

Large gains by the Libbey-Owens-Ford Glass Co. and the Spicer Manufacturing Corp., not included in this group, have virtually made up the losses due to the lay-offs at the Willys-Overland plant.

Libbey-Owens-Ford, Logan Gear, Doehler Die Casting, Toledo Machine & Tool Co. and Textile Leather Corp. report double the production now over the same time last year. Big gains ranging from 25 to 50 per cent have also been reported by the Bunting Brass & Bronze Co., DeVilbiss Co., Champion Spark Plug Co., and Acklin Stamping Co. Champion reported its production ahead of 1929 volume.

The City Auto Stamping Co. is working its local plant to capacity on new ventilation equipment and radiator shells and is farming out some work.

Cord Corp. Profits $1,380,006 for 1933

CHICAGO—Consolidated net profit of the Cord Corporation for the fiscal year ending Nov. 30, 1933 amounted to $1,380,006, equal to 61 cents a share on 2,260,000 shares of $5.00 par capital stock outstanding.

The balance sheet for the fiscal year ended Nov. 30, 1933, shows current assets amounting to $8,865,380 and current liabilities of $711,460. The ratio of current assets to current liabilities on that date was 12.46 to 1.

Perfect Circle Declares Regular Dividend

HAGERSTOWN — The regular quarterly cash dividend on 162,500 shares of stock outstanding has been declared by the board of directors of the Perfect Circle Company. The dividend, amounting to 50 cents a share, is payable April 1, 1934, to stockholders as of record March 20, 1934.

Vesper Urges One Show in Detroit

DETROIT—One national automobile show to be held here, was advocated in a statement made by F. W. A. Vesper, president of the National Automobile Dealers Association, during the week of the local exhibition. In Mr. Vesper's opinion, the single show should be staged by the manufacturers and should be open to the trade only on the first two or three days with the general public admitted on the remaining days of its run. This, he said, "would result in a closer understanding and cooperation between manufacturers and dealers, particularly those in districts far from the manufacturing centers. The first automobile shows were really dealer shows but they have expanded until they have become exhibitions for manufacturers, dealers, salesmen, the buying public and the sight-seers, with such huge crowds that the original purpose has been lost."

The single show would, of course, be supplemented by local shows staged by local dealers for the benefit of the public generally.

G. M. Williams Heads Russell

INDIANAPOLIS—G. M. Williams, former president of the Marmon Motor Car Company, has been named president of the Russell Manufacturing Company, Middletown, Conn.

G. M. Williams

Under a reorganization, MacDonough Russell, former president of the Russell firm, will become chairman of the board.

The Russell firm has been in receivership since 1931 and application has been made in Connecticut courts for the discharge of the receivership and approval of the reorganization.

R. J. Pearce

DETROIT—R. J. Pearce, for the past seven years general assistant service and parts manager for Chevrolet Motor Co., was killed Sunday night, Jan. 28, when his car was struck by another during a blinding snow storm near Jackson, Mich. He was en route to the Chicago Automobile Show accompanied by his wife and a friend who were injured in the accident. Mr. Pearce was 42 years old.

His entry into the automobile business was as manager of the Ford Motor Co. branch office in Milwaukee. Later he became assistant manager of the Ford accessories department in Detroit 12 years ago.

He is survived by his widow and four children, James, 13; Ruth, 11; Richard, 9, and Frederick, 5.

Flat Steel Prices Expected to Rise

Lower Stainless Prices Are No Indication of General Downward Trend

NEW YORK—Reductions in prices of several types of so-called stainless steels, ranging from 1¾ to 4 cents per pound, which become fully effective Feb. 1, cannot be interpreted, as they have been in some quarters, as denoting a "declining tendency" in the steel market as a whole.

These alloy steels with a high chromium content, now sell in the form of cold-rolled strip at 22 to 27 cents a pound, so that they are but little influenced by the market for ordinary steels, and certainly exert no influence at all on the latter. Moreover, these price reductions have been made in the face of recent advances in the market for ferrochromium. They were prompted by recognition on the part of the producers of this class of alloy steels that the increase in the outlet for stainless steels made possible by reducing the price will more than make up for whittling down the profit margin. Patent royalties and relatively high production costs tend to operate against any too-sudden or too-sharp lowering of prices, but as consumption of this class of alloy steels grows, prices are certain to come down. They are in a category by themselves, having little to do with the market for tonnage steels.

Sentiment in the latter this week leans even stronger to the belief that further mark-ups of flat steel descriptions are not far off. The smaller rollers of sheets and strips complain that their costs do not permit them to profit from greater volume of demand. Other producers would postpone upward price revision as long as possible.

Automotive commitments continue to come out at a good pace, Cleveland, Detroit and Youngstown district mills having been able to improve their operating rates. While General Motors and Ford business comes in for most mention, other motor car manufacturers and parts makers in general are showing more and more activity in the steel market.

Pig Iron—While some of the larger automotive foundries are covered for their melting needs in February and in some cases even longer, here and there rush orders for castings bring out fair-sized inquiries for iron. Base prices, f.o.b. Jackson, Ohio, of $19.25 for foundry and malleable have been filed with the Code authority and become effective. So far Jackson base price filings had covered only silvery iron.

Aluminum — Demand for secondary aluminum from automotive consumers, especially for cylinder heads, is so much on the uptrend that remelters have had to offer much higher prices for their scrap requirements. No. 12 remelted, which was freely offered at 12c. a few weeks ago, is now held at 13¼ @ 13½c. Virgin metal quotations remain unchanged.

Copper—Another Code meeting is scheduled for Washington this week and some sort of agreement is then looked for. Meanwhile the market is marking time.

Shippers, Farmers and Truckers Flay Rayburn Bill at Congressional Hearing

Charge It Will Promote Railroad Monopoly and Destroy Trucking Interests — Urge Legislation Be Postponed until Truckers Test Self Regulation under NRA Code

WASHINGTON—A running fire of opposition and criticism has been directed at the Rayburn Bill (H. R. 6836), providing for the regulation of motor carriers by the railroad-minded Interstate Commerce Commission at the hearings held by the House Committee on Foreign and Interstate Commerce. The objections have come not only from carriers who would be subject to the Bill, but from industrial and agricultural interests who make use of their services.

Complete opposition to the Bill's proposals for regulating common and contract truck carriers was voiced by the American Trucking Associations, Inc., which was represented by Judson C. Welliver, director of the Pennsylvania Motor Truck Association and a former secretary to the late President Coolidge, and by Harold Shertz, counsel for the Pennsylvania organization. They characterized the bill as promotive of transportation monopoly and as destructive of independent trucking operations, and urged that truckers be given an opportunity to regulate themselves under the NRA code now pending.

"We now have the opportunity for a thorough laboratory test, using the Trucking Code," Mr. Shertz said. "We are asking this committee to postpone this legislation and permit the test—because it will give you the type of information about our business, and knowledge of our enforcement experience, upon which action by Congress in a new field should be predicated.

"The first chance American business had to shake off the shackles of railroad transportation monopoly," Mr. Welliver said in his presentation, "came with the motor vehicle. It is the passenger automobile, rather than the truck, that has hurt rail revenues; but it would be useless to attack the passenger car's rights on the road. There are 25,000,000 passenger cars. They have too many friends. So, the fight has been centered on the truck. Among the thousands of highway regulation measures urged in the legislatures last winter by the railroads, nearly all were deliberately designed to hamper highway traffic. Under pretense of saving the roads, or of making them safe, or of raising public revenue, was thinly concealed the real motive—the destructive purpose. The measure before you represents that same purpose. If the railroads at length succeed at state capitals and here, they will cripple the highway's usefulness, just as surely as, a few decades ago, they destroyed the canal system and drove the steamboats off the rivers. Thus removing the one competitor that remains to menace their control, they will rivet their monopoly tighter than ever."

A. M. Hill, president of the National Association of Motor Bus Operators, stated that bus operators did not oppose Federal regulation, but that they wanted to be considered separately from trucks. In view of the recent approval of rail rate cuts, he also raised a question as to whether the bus operators could expect a square deal from the I.C.C.

Rate regulation of contract carriers was opposed by A. M. Loomis, National Dairy Union, and by C. W. Holman, National Cooperative Milk Producers Ass'n. Both of these gentlemen favored self-regulation through an NRA code.

The National League of Commission Merchants appeared to advocate that certificate holders be barred from hauling for themselves.

Rate regulation for all truck carriers and any detailed regulation of contract carriers was opposed by C. E. Childe, representing the National Industrial Traffic League. He favored self-regulation under the code and charged that the Bill would give aid to large businesses at the expense of small enterprises. The National Delivery Association also condemned the measure as inspired by the railroads and inimical to every consideration of sound public policy.

Representing 800,000 farmers, the Washington representatives of the National Grange said, "There is no public demand for this type of regulation," adding that truck rates are not excessive or discriminatory. He pointed out that farmers had been benefited by the competition between rails and trucks, and that the passage of a regulatory bill would result in increased truck rates to the farmers and substantial curtailment of truck service.

The Bill received a general endorsement from the U. S. Chamber of Commerce with the exception that it felt that a trucker should be allowed to operate as both a common and contract carrier.

Prosperity's Sources

"THE essential weakness in the approach to prosperity by the synthetic route is that industrial and commercial activity is not a static compound. Rather, it is more nearly akin to the activity of a myriad of growing, living organisms, which, because they live, inherently possess the powers of growth and multiplication. Given the living seed and a fertile soil in which to germinate, the organisms will grow and flourish into vigorous life.

"We have in our national economy thousands of such organisms in the form of industrial, commercial and business units, part in embryo, part temporarily dormant awaiting the fertilizing influence of confidence in the future to spring into natural, spontaneous growth. When new enterprises can be planted and old ones revived with a feeling of assurance that contracts undertaken will be fulfilled by all parties; when prospects are brighter that our governments will maintain themselves on a sound financial footing and strive for balanced budgets; and when our medium of exchange acquires such stability as to facilitate forward commitments, then credits will be enlarged by the requirements of these growing units, prices will hold firm as the result of the demands of one of them upon the other, and debts will be liquidated with the proceeds of their enhanced activities. The return of such phenomena we will recognize as the result of revived prosperity."

—From President Lammot du Pont's 1933 report on the E. I. du Pont de Nemours & Co., Inc.

Payrolls Up in December

WASHINGTON — Automotive employment increased to 58.6 in December against 50.1 in November, and 45.2 in December, 1932, according to Federal Reserve Board Indexes. The index of the industry's payrolls for the last month of 1933 stood at 43.3 against 37.3 in November, and 32.0 in December, 1932.

C.I.T. Earns $7,474,394

NEW YORK—With its volume of business and earnings for the common stock exceeding those of any year since 1929, Commercial Investment Trust Corporation reports for 1933 consolidated net profits available for dividends of $7,474,394, compared with $5,719,775 in 1932.

Goodrich Brings Out Truck and Bus Batteries

AKRON—Following its recent introduction of the "Electro-Pak" automobile storage battery for passenger cars, The B. F. Goodrich Company now announces an extension of its line to include batteries made for practically every size, truck, bus, fire truck, taxicab and tractor.

Plates in the new batteries are of special bus and truck design, heavier than those used for passenger car batteries. Separators are of vertical grain Port Orford cedar, whose insulating strength is increased by perforated rubber sheets. The connectors are large, flexible lead coated copper strips, designed to carry high discharge.

The bus and truck T & H types carry a guarantee and adjustment policy for eight months or 24,000 miles, passenger car Super types in truck service 12 months or 24,000 miles and passenger car standard and heavy duty types in truck service nine months or 18,000 miles.

NACC Endorses Plan To Advertise Safety

NEW YORK — Approval of the safety advertising plan being sponsored by the Eastern Conference of Motor Vehicle Administrators by directors of the National Automobile Chamber of Commerce, was announced today.

Under the plan, automobile, tire, gasoline and parts and accessory companies will be invited to devote some share of their advertising in newspapers, magazines, radio and billboards to the subject of safety.

The action of the chamber directors carries with it a recommendation that automobile companies support the efforts of the commissioners.

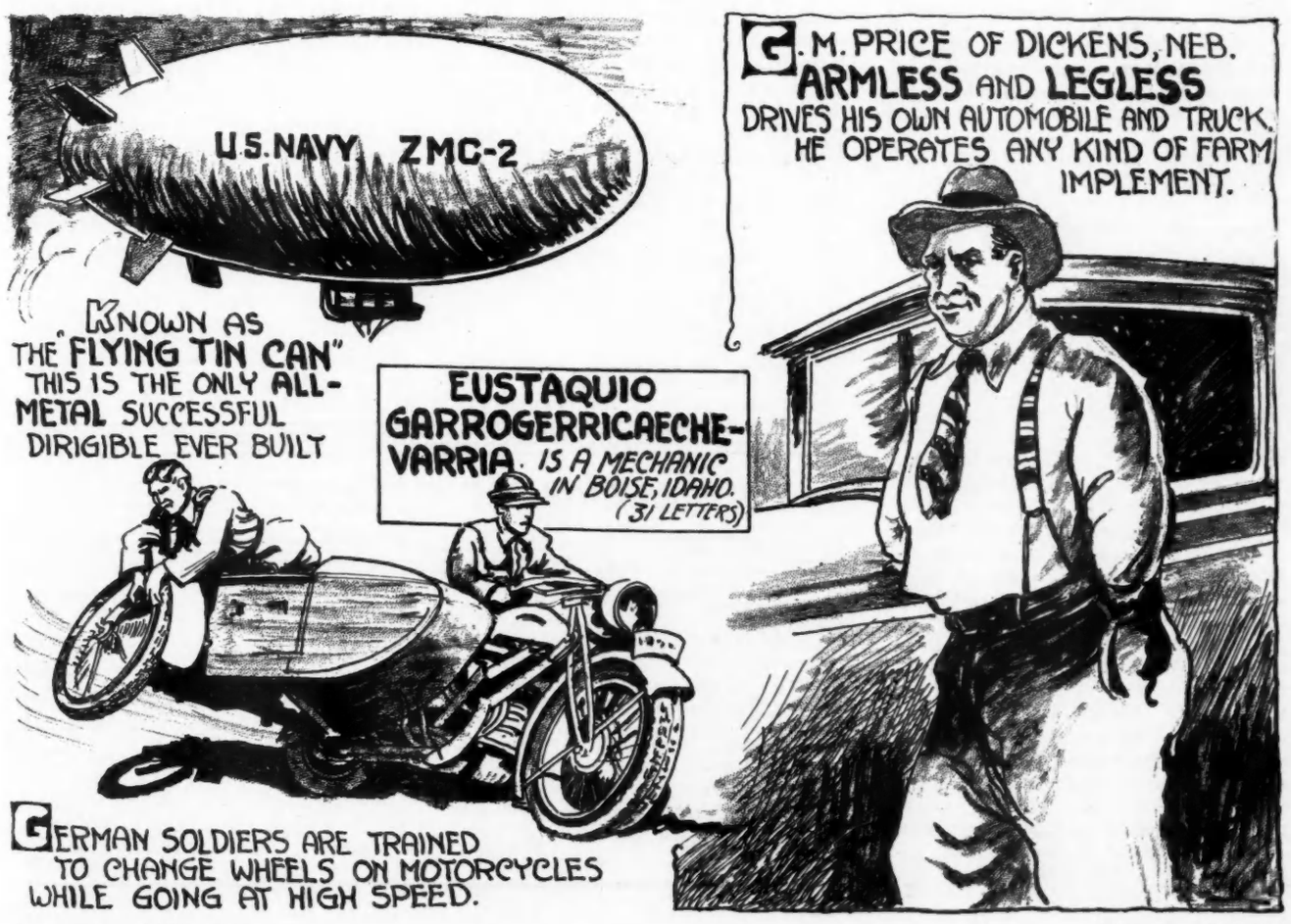
Joint Committee Named To Study Jobber Code

NEW YORK—The committee which the approved Code for the Wholesale Automotive Trade directs shall be named to study alleged unfair practices in the distribution of automotive merchandise will consist of the following: Representing the N.A.C.C., Grant Sturgis, General Motors; W. H. Kilpatrick, Chrysler, and F. R. Fowles, Hudson. Representing the A.P.E.M., M. C. Dewitt, Champion Spark Plug; W. K. Norris, McQuay-Norris, and A. C. Darling, Borg-Warner. Representing the N.A.D.A., C. E. Gambill, Chicago; J. W. Tarbill, Cincinnati; J. M. Block, Indianapolis, and John O. Munn, N.A.D.A., St. Louis.

Following the reports of this committee, NRA Administrator Johnson will determine whether or not the resale price maintenance sections of the Wholesale Code shall become effective.

Automotive Oddities—By Pete Keenan

Write us If you know an Oddity


U.S. NAVY ZMC-2
KNOWN AS THE "FLYING TIN CAN" THIS IS THE ONLY ALL-METAL SUCCESSFUL DIRIGIBLE EVER BUILT
EUSTAQUIO GARROGERRICAECHE-VARRIA IS A MECHANIC IN BOISE, IDAHO. (31 LETTERS)
GERMAN SOLDIERS ARE TRAINED TO CHANGE WHEELS ON MOTORCYCLES WHILE GOING AT HIGH SPEED.
G. M. PRICE OF DICKENS, NEB. ARMLESS AND LEGLESS DRIVES HIS OWN AUTOMOBILE AND TRUCK. HE OPERATES ANY KIND OF FARM IMPLEMENT.

Chryslers Cuts Six Prices $40 to $65

DETROIT—Price reductions ranging from $40 to $65 from the schedules announced at the New York Show, have been made on the Chrysler Six line. The new prices, however, range from $10 to $15 higher than on the corresponding models last year except on the business coupe, which is reduced $20 to $725. Prices on two 121-in. six-cylinder models were also announced, no prices on these jobs having been available previously. A comparison of the new prices with those announced at the New York Show and the 1933 schedule follows:

117-In.	New	Old	1933 Price
Business coupe..	$725	$790	$745
Deluxe coupe....	775	830	775
Conv. coupe.....	810	850	795
Brougham	755	800	745
4-d. sedan	795	850	785
121-In.			
Close-coupled sedan	885	...	...
Conv. sedan.....	935	...	...

Harry H. Wyatt

DETROIT—Harry H. Wyatt, 48 years old, secretary and treasurer of the Detroit Gray Iron Foundry Co., died Jan. 28, following a brief illness of pneumonia. He joined the Detroit Gray Iron Foundry in 1918 in the position he held at his death. He was also vice-president of the Detroit Alloy Steel Co. and a director in both companies.

Ragan with Cleveland Graphite

CLEVELAND—Frederick H. Ragan, recently vice-president of Columbia Axle Co., and formerly chief engineer of Gemmer, is now connected with the Cleveland Graphite Bronze Co. Among Mr. Ragan's duties will be the development of new products.

Sales and Attendance Gain at Chicago Show

(*Continued from page 142*)

Tuesday night was attended by 1200.

The official opening of the Coliseum show revealed a greatly changed interior decoration scheme. This was particularly evident in the annexes, heretofore resembling stables. The improved decoration scheme provided more advantageous backgrounds for displaying the new models.

Individual manufacturers presented supplementary shows in leading hotels and the Ford exhibit was as usual in the 16th Street armory, adjacent to the Coliseum. Ford officials report all attendance records broken at their display. Mechanical displays, as at the main show, were the chief attraction for the crowds.

The dozens of dealer and organization meetings attracted larger numbers of company representatives than ever before and sales sessions are reported the most enthusiastic in years, directors finding a tremendous response to the innovations they are offering the car purchaser this year.

Early attendance at the General Motors exhibit increased 300 per cent. Plymouth reports retail sales at Show 65 per cent ahead of last year. Nearly 12,000 saw the Chrysler air flow models in the first two days of their Congress Hotel display.

Courtney Johnson Becomes Nash-LaFayette Sales Mgr.

KENOSHA, WIS.—C. H. Bliss, vice-president and director of sales of The Nash Motors Company, late last week announced the appointment of Courtney Johnson as sales manager

Courtney Johnson

for Nash and LaFayette cars, with headquarters in Kenosha.

In 1928 Mr. Johnson was made general sales manager for the Hudson Motor Car Company and in 1931 joined the General Motors executive sales staff. When the Buick-Oldsmobile-Pontiac sales division was formed in 1932, he was made assistant general sales manager. Prior to his Hudson connection, Mr. Johnson was associated with Gardner and Dort.

Evans Joins Austin Board

BUTLER, PA.—R. S. Evans, president of the Evans Operations, Atlanta, has been elected a member of the board of directors, immediately after the New York show.

New Franklin Readjustment Committee Is Organized

SYRACUSE—Readjustment of the capitalization of the H. H. Franklin Mfg. Co. will be undertaken by a new committee consisting of William H. Kelley, president, and F. H. Plumb vice-president, of the Merchants National Bank & Trust Co., and Harold Stone, president of Onondaga County Savings Bank, all of this city, according to an announcement by H. H. Franklin, president.

The former committee headed by E. B. Warriner has elected to terminate the deposit agreement of June 8, 1933, and stock certificates deposited thereunder are being returned to their owners. Mr. Franklin stated that the discontinuance of the activities of the Warriner committee in no way affected the extension of the company's bank loans and the continuation of the present production program.

F. T. Delany and R. M. Tannant have been elected directors of the company, succeeding John E. Williams, resigned, and the late Edwin McEwen. Mr. Williams also has resigned as vice-president and director of the Franklin Automobile Co.

Warm Springs Foundation Gets $22,500 From Industry

DETROIT—A $22,500 contribution to the fund for the Warm Springs Foundation for Infantile Paralysis was made this week from the automobile industry as a whole.

155,111 See Detroit Show

DETROIT—The 33rd annual Detroit Automobile Show closed Saturday night with a total attendance for the week of 155,111, a 30 per cent increase over the attendance last year. The only year to surpass the current year's total was in 1928 when 156,620 visitors were recorded.

A final survey indicated, from dealer reports, that 40,000 people who visited the show plan to purchase cars this winter or spring.

CALENDAR OF COMING EVENTS

AUTOMOBILE SHOWS

Chicago	Jan. 27-Feb. 3
Washington, D. C.	Jan. 27-Feb. 3
Indianapolis	Feb. 3-9
St. Paul	Feb. 3-10
Toledo, Ohio	Feb. 3-9
Camden, N. J.	Feb. 3-10
Los Angeles	Feb. 3-11
Omaha, Neb.	Feb. 5-9
Lansing, Mich.	Feb. 7-10
Rapid City, S. D.	Feb. 7-10
Springfield, Ill.	Feb. 8-10
Kansas City, Mo.	Feb. 10-17
Syracuse, N. Y.	Feb. 10-17
Black Hills, S. D.	Feb. 15-17
Des Moines, Ia.	Feb. 19-24
Evansville, Ind.	Feb. 20-24
Denver, Colo	Feb. 20-28
Peoria, Ill.	Feb. 21-25

MEETINGS

American Institute of Mining & Met. Engineers, New York City	Feb. 19-22
U. S. Chamber of Commerce, Washington	May 1-4